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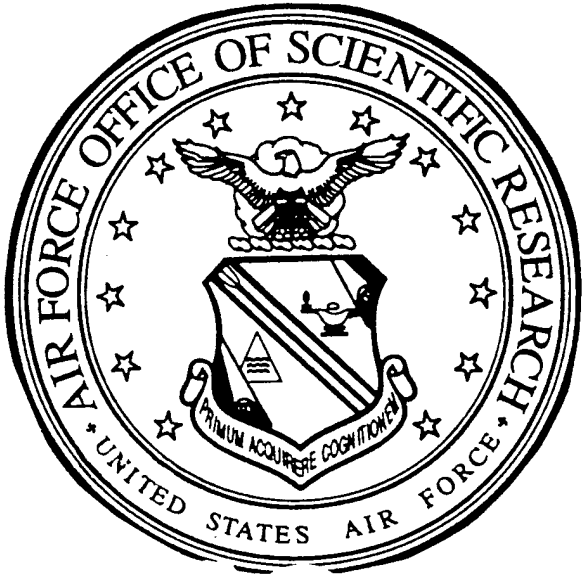

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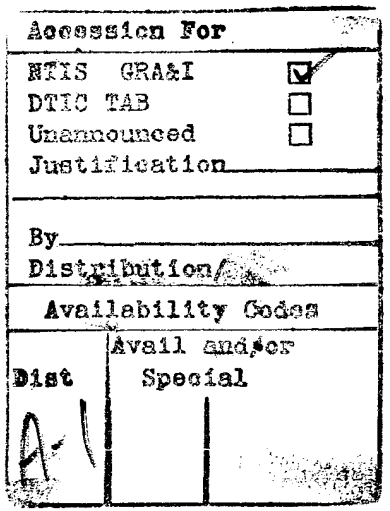

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The Air Force Office of Scientific Research (AFOSR) Technical Report Summaries is published quarterly (March, June, September, and December). It contains a brief summary of each technical report received in the Technical Information Division and submitted to the Defense Technical Information Center (DTIC) for the quarter. Three indexes, subject, personal author and title are provided to help the user locate reports that may be of interest.

AFOSR does not maintain copies of technical reports for distribution. However, you may obtain any of these reports if you are registered with DTIC by requesting the AD number of that report from the DTIC, Cameron Station, Alexandria, Virginia, 22314.

PURPOSE

The purpose of this report is to inform Air Force Laboratories about the science that the Air Force Office of Scientific Research is supporting.

AFOSR MISSION

The Air Force Office of Scientific Research (AFOSR) is the single manager of the Air Force Defense Research Sciences Program (Program Element 61102F) and the primary Air Force agency for the extramural support of fundamental scientific research. To sponsor and sustain basic research and ensure access to research results in support of the Air Force goals of control and maximum utilization of air and space. The AFOSR is organized under the Director, Science and Technology, Air Force Materiel Command.

AFOSR awards grants and contracts for research in areas of science relevant to the needs of the Air Force. Research is selected for support from proposals received in response to the Broad Agency Announcement originating form scientists investigating problems involving the search for new knowledge and the expansion of scientific principles. Selection is on the basis of scientific potential for improving Air Force

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The summaries consist of three indexes and the abstracts. From one of the indexes, located in the AD number of the report that is of interest to you. Use this number to locate the abstract of the report in the abstracts sections. The first report submitted to DTIC during the quarter (the one with the lowest AD number) appears on the last page of the abstracts section. The last report submitted to DTIC during the quarter (the one with the highest DTIC number) appears on the first page of the abstracts section. The following terms will give you a brief description of the elements used in each summary of this report.

DTIC Report Bibliography - DTIC's brief description of a technical report.

Search Control Number - A number assigned by DTIC at the time a bibliography is printed.

AD Number - A number assigned to each technical report when received by the DTIC.

Field & Group Numbers - (appearing after the AD number) First number is the subject field, and the second number is the particular group under that subject field.

Corporate Author/Performing Organization - The organization; e.g., college/university, company, etc., at which the research is conducted.

Title - The title of the technical report.

Descriptive Note - Gives the type of report; e.g., final, interim, etc., and the time period of the research.

Date - Date of the technical report.

Pages - Total number of pages contained in the technical report.

Personal Author - Person or persons who wrote the report.

Contract/Grant Number - The instrument control number identifying the contracting activity and funding year under which the research is initiated.

Project Number - A number unique to a particular area of science; e.g., 2304 is the project number for mathematics.

Task Number - An alphanumeric number unique to a specific field of the main area of science; e.g., 2304 is the project number for mathematics and A3 is the task number for computational sciences.

Monitor Number - The number assigned to a particular report by the government agency monitoring the research. The number consists of the government monitor acronym, the present calendar year and the technical report assigned consecutively; e.g., AFOSR-TR-93-0001 is the first number used for the first technical report processed for calendar year 1993.

Supplementary Note - A variety of statements pertaining to a report. For example, if the report is a journal article, the supplementary note might give you the journal citation, which will include the name of the journal that article it appears in, and the volume number, date and the page numbers of the journal.

Abstract - A brief summary describing the research of the report.

Descriptors - Key words describing the research.

Identifiers - Commonly used designators, such as names of equipment, names of projects or acronyms, the AFOSR project and task number, and the Air Force Research Program Element number.

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ARMOUR RESEARCH FOUNDATION CHICAGO IL

(U) Abstracts of Papers for the AFOSR Contractors' Meeting on Chemical Kinetics of Propulsion (2nd).

SEP 61 21P

MONITOR: AFOSR, XC
1417, AFOSR

UNCLASSIFIED REPORT

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DESCRIPTORS: (U) *PROPULSION SYSTEMS, *CHEMICAL REACTIONS, *KINETICS, HYDRODYNAMICS, FLAMES, ABSTRACTS, ATOMS, SUPERSONIC FLOW, FREE RADICALS, IONS, ELECTRONS, RECOMBINATION REACTIONS, SYNTHESIS, NITROGEN, DISSOCIATION, HALOGENS, SHOCK WAVES.

IDENTIFIERS: (U) Monoenergetics ions

AD-B193 672 12/1

MARTIN MARIETTA CORP BALTIMORE MD RESEARCH INST FOR ADVANCED STUDIES

(U) Some Extensions of Liapunov's Second Method.

DESCRIPTIVE NOTE: Technical rept.,

59 38P

PERSONAL AUTHORS: LaSalle, J. P.

REPORT NO. TR-60-5

CONTRACT NO. AF 49(638)-382

MONITOR: AFOSR, XC
TN-60-22, AFOSR

UNCLASSIFIED REPORT

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ABSTRACT: (U) In studying the stability of a system it is never completely satisfactory to know only that an equilibrium state is asymptotically stable. As a practical matter, it is necessary to have some idea of the size of the perturbations the system can undergo and still return to the equilibrium state. It is never possible to do this by examining only the linear approximation. The effect of the nonlinearities must be taken into account. Liapunov's second method provides a means of doing this. Mathematical theorems underlying methods for determining the region of asymptotic stability are given, and the methods are illustrated by a number of examples

DESCRIPTORS: (U) *PERTURBATIONS, *LYAPUNOV FUNCTIONS, STABILITY, DIFFERENTIAL EQUATIONS, ASYMPTOTIC NORMALITY, NONLINEAR ANALYSIS, SOLUTIONS(GENERAL).

IDENTIFIERS: (U) Asymptotic stability.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

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AEROJET-GENERAL CORP AZUSA CA

(U) Ion Engine Development, 1. Diffusion Type Ion Sources,

AUG 60 35P

PERSONAL AUTHORS: Sunderland, R. J.; Radbill, J. R.; Gilpin, R. D.

CONTRACT NO. AF 49(638)-214

MONITOR: AFOSR, XC
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ABSTRACT: (U) The limitations of chemically propelled space vehicles are well understood as is the urgency of extending the performance of rocket devices. The nuclear powered rocket will be capable of specific impulses of the order of 1000 seconds, but for economical voyages within the solar system and beyond, much higher effective exhaust velocities will be required. Electrical methods of propulsion offer a means of achieving these high velocities, but unfortunately at extremely low thrust levels with presently envisioned mechanisms. The success of one such method, the ion propulsion system, depends critically upon the development of suitable ion sources. Until recently, ion sources have been primarily intended for applications concerning mass analyzers or particle accelerators. The mass utilization efficiency, lifetime, and power efficiency of these sources has not been particularly impressive. Our current ion course development is based upon the concept wherein the material to be ionized, the expellant, is made to pass through a suitable membrane and become ionized on the exit surface. Such a source should be capable of producing copious quantities of ions for extended periods and in addition have the feature of continuous replenishment of ionizable material without interaction with the ion beam itself. Several such sources have been investigated in the Aerojet Astronautics Laboratory. These include, the ionization of gases and vapors upon diffusion through heated metal foils, the ionization of alkali metals upon electrolysis through platinum coated glass membranes, and the ionization of alkali metal

AD-B193 620 CONTINUED

vapors upon diffusion through porous tungsten maintained at elevated temperatures. The experimental results of the investigations will be discussed, and an outline given of the future work in this area. (Author)

DESCRIPTORS: (U) *ION ENGINES, *SPACE PROPULSION, *ION SOURCES, TUNGSTEN, IONIZATION, DIFFUSION, THRUST, SPECIFIC IMPULSE, CESIUM, ION BEAMS, EFFICIENCY.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-B193 393L 9/1 20/3 7/2 11/3

WRIGHT MATERIALS RESEARCH CO BEAVERCREEK OH

(U) High Temperature Electronic Packaging: Thermal Evaluation of the SiC/BN/W Packaging System.

DESCRIPTIVE NOTE: Annual progress rept. 1 Aug-31 Oct 94,

NOV 94 4P

PERSONAL AUTHORS: Han, B.; Tan, Seng C.

CONTRACT NO. F49620-94-C-0066

MONITOR: AFOSR, XC
TR-94-0719, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Wright Materials Research Co. and University of Dayton Research Institute propose to examine the feasibility of using boron nitride/tungsten as the dielectric/metallization system for SiC based multi-chip, multi-layer devices. The proposed SiC technology, for advanced electronic high power devices, is expected to require operating capabilities at or near 700 deg C. The contractor propose to use a novel growth technique for the BN dielectric thin film, utilizing a pulsed arc cluster source, and low substrate temperature. The proposed contact metallization is tungsten, to be sputtered onto the SiC. Interface chemistry, electrical performance, and mechanical integrity of the proposed SiC/BN/W system will be evaluated throughout thermal aging, oxidation, cycling and shock tests, conducted with and without electrical loading. Thermal testing is designed to evaluate the performance of the system at both 350 and 700 deg C. Chemical evaluation will be determined using Auger depth profile and x-ray photoelectron spectroscopy. Mechanical integrity will be examined by scanning electron microscopy. Contact resistance and dielectric capacitance will be measured. Silicon carbide, Electronic packaging, Dielectric films, Metallization.

DESCRIPTORS: (U) *BORON NITRIDES, *DIELECTRIC FILMS,

AD-B193 393L

AD-B193 393L CONTINUED

*ELECTRONICS, *PACKAGING, *SILICON CARBIDES, *TUNGSTEN, *HIGH TEMPERATURE, AUGERS, CAPACITANCE, CHEMICALS, CHEMISTRY, DEPTH, ELECTRON MICROSCOPY, ELECTRONS, HIGH POWER, INTERFACES, LAYERS, MATERIALS, MICROSCOPY, OXIDATION, POWER, PROFILES, RESISTANCE, SCANNING, SHOCK TESTS, SUBSTRATES, TEST AND EVALUATION, THIN FILMS, X RAY PHOTOELECTRON SPECTROSCOPY, THERMAL ANALYSIS, METALLIZING, CIRCUITS, COMPOSITE MATERIALS.

IDENTIFIERS: (U) PE65502F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-B192 708 21/5 7/2 13/1

PRINCETON UNIV NJ DEPT OF AERONAUTICAL ENGINEERING

(U) An Analysis of the Effects of Perfect Gas Parameters on Gas Turbine Performance.

DEC 59 32P

PERSONAL AUTHORS: Hammitt, Andrew G.

CONTRACT NO. AF 49(638)-465

MONITOR: AFOSR, XC
TN-60-225, AFOSR

UNCLASSIFIED REPORT

Distribution: DTIC users only.

DESCRIPTORS: (U) *GAS TURBINES, *GASES, *HEAT EXCHANGERS, PARAMETERS, SPECIFIC HEAT, SOUND, VELOCITY, VISCOSITY, RATIOS, TURBOMACHINERY, AIR FORCE.

AD-B192 657L 7/6 20/6 20/3 9/1

TACAN CORP CARLSBAD CA

(U) Ultrahigh Speed Electro-Optic Modulators With Multifunctional Polymers. Phase 2.

DESCRIPTIVE NOTE: Annual technical rept. Jul-Oct 94,

OCT 94 48P

PERSONAL AUTHORS: Salour, Michael; Shi, Yongaing; Bechtel, James H.

CONTRACT NO. F49620-93-C-0072

PROJECT NO. 3005

TASK NO. SS

MONITOR: AFOSR, XC
TR-94-0712, AFOSR

UNCLASSIFIED REPORT

Distribution authorized to DoD only; Proprietary Info.; 31 Oct 94. Other requests shall be referred to Air Force Office of Scientific Research/NL, Bolling AFB, DC 20332.

ABSTRACT: (U) This annual technical report summarizes TACAN's research work during the project year from October 1993 through September 1994. The report is focused on the performance of task objectives and the achievements during this period. TACAN has made much progress in investigating electro-optic polymer devices and their commercial applications. TACAN has characterized two electro-optic polymers: the nonlinear optical properties, thermal stability, and optical power handling capability of the materials. The test results of an integrated birefringent modulator, made of thermoset polyurethane with Disperse Red 19 pendant groups, are presented in this report. The modulator has been used in a fiber-optic video link to demonstrate its application in an amplitude modulated CATV transmission system. Based on the test results and calculation, the requirements of the modulator parameters, and the related material properties are discussed. The related technical publications, conference presentations, personnel associated with the contract, interactions with other institutions, and new measurement techniques are also

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-B192 657L CONTINUED

presented.

DESCRIPTORS: (U) *MODULATORS, *POLYMERS, *ELECTROOPTICS, *VELOCITY, AMPLITUDE, FIBER OPTICS, HANDLING, INTERACTIONS, MATERIALS, MEASUREMENT, OPTICAL PROPERTIES, OPTICS, PARAMETERS, PERSONNEL, POWER, REQUIREMENTS, STABILITY, TACAN, TEST AND EVALUATION, THERMAL STABILITY, NONLINEAR OPTICS, URETHANES.

IDENTIFIERS: (U) PE65502F, WUAFOSR3005SS, *Multifunctional, *Ultrahigh, Polyurethanes

AD-B190 014L 5/8 6/4 12/9

SAM TECHNOLOGY INC SAN FRANCISCO CA

(U) Physiological Indices of Mental Workload.

DESCRIPTIVE NOTE: Annual rept. 16 Dec 92-31 Aug 94.

AUG 94 5P

PERSONAL AUTHORS: Gevins, A. S.; Smith, M.

CONTRACT NO. F49620-92-C-0013

PROJECT NO. 3005

TASK NO. SS

MONITOR: AFOSR, XC
TR-94-0589, AFOSR

UNCLASSIFIED REPORT

Distribution: Further Dissemination only as directed by AFOSR/NC, Bolling AFB, DC 20032-6448, 4 Oct 94 or higher DoD authority;

DESCRIPTORS: (U) *INTEGRATED SYSTEMS, *PILOTS, *MAN MACHINE SYSTEMS, *ELECTROENCEPHALOGRAPHY, NEURAL NETS, AIRCRAFT, BRAIN, AIR FORCE RESEARCH, STRESS(PHYSIOLOGY), SENSES(PHYSIOLOGY), STIMULATION(PHYSIOLOGY), RECEPTOR SITES(PHYSIOLOGY), WORKLOAD.

IDENTIFIERS: (U) WUAFOSR3005SS, PE65502F, Mental workload, Physiological indices.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-B189 934 20/9 12/1

CALIFORNIA INST OF TECH PASADENA GRADUATE AERONAUTICAL LABS

(U) Magnetohydrodynamic Simple Waves (Supplement).

DESCRIPTIVE NOTE: Technical note,

MAY 60 25P

PERSONAL AUTHORS: Lynn, Y. M.

CONTRACT NO. AF-49(638)-476

MONITOR: AFOSR, XC
TN-59-1302, AFOSR

UNCLASSIFIED REPORT

Distribution: DTIC users only.

DESCRIPTORS: (U) *MAGNETOHYDRODYNAMIC WAVES, TRANSVERSE WAVES, MAGNETIC FIELDS, WAVE EQUATIONS, SOLUTIONS(GENERAL), EQUATIONS OF STATE, COMPUTATIONS, INTEGRAL EQUATIONS.

IDENTIFIERS: (U) Simple waves, Nonlinear ordinary differential equations

AD-B189 860L 7/6 20/6 7/3

CALIFORNIA UNIV SANTA BARBARA INST FOR POLYMERS AND ORGANIC SOLIDS

(U) Conjugated Polymers with Degenerate Ground State: The Route to High Performance NLO Response.

DESCRIPTIVE NOTE: Annual rept.,

MAR 94 9P

PERSONAL AUTHORS: Heeger, Alan J.

CONTRACT NO. F4920-93-1-0191

PROJECT NO. 2313

TASK NO. CS

MONITOR: AFOSR, XC
TR-94-0618, AFOSR

UNCLASSIFIED REPORT

Distribution autherized to DOD only; Critical technology; 30 Sep 94. Other rsquests shall be referred to Air Force Office of Scientific Research/NL, Bolling AFB, Washington, DC 20332-6448.

ABSTRACT: (U) Progress during the reporting period focused on characterization of the optical and nonlinear optical properties of degenerate ground state conjugated polymers. Soluble conjugated derivatives of poly(1,6-heptadiyne) were synthesized and studies in detail. All features expected for a degenerate ground state system were observed and verified. The third harmonic generation spectrum of poly(1,6-heptadiyne diester) was measured with results in agreement with theory based upon soliton-antisoliton intermediate states as the origin of the large NLO response. The two-photon absorption spectrum of trans-polyacetylene was measured. Although the relatively large Im(chi cubed) limits the use of polyacetylene in serial optical computer architectures, we concluded that a parallel architecture with short optical pathlengths can be used with considerable advantage. This concept was implemented by the demonstration of an optical image processor based upon the poly(1,6-heptadiyne diester) which carries out image correlations in 160 fs. This optical computer has achieved peak processing rates of

AD-B189 860L CONTINUED

3x10(exp 16) operations per second, which is the fastest processing rate achieved. (Author)

DESCRIPTORS: (U) *POLYMERS, *GROUND STATE, *NONLINEAR OPTICS, *ESTERS, *ORGANIC COMPOUNDS, RESPONSE, OPTICAL PROPERTIES, SYNTHESIS, SOLITONS, COMPUTER ARCHITECTURE, PHOTONS, ABSORPTION SPECTRA, ACETYLENE, IMAGES, THIRD HARMONIC GENERATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313CS, *Conjugated, *Degenerate, *Poly(16-heptadiyne Diesters)

AD-B189 822 20/6 7/6

ADTECH SYSTEMS RESEARCH INC BEAVER CREEK OH

(U) Nonlinear Optical Chromophores and Polymeric Materials.

DESCRIPTIVE NOTE: Annual rept. 1 Aug 93-1 Aug 94,

AUG 94 73P

PERSONAL AUTHORS: Feld, William A.; Goldfarb, Ivan; McKellar, R. M.; Renner, M.; Singhal, Rakesh

CONTRACT NO. F49620-93-C-0051

PROJECT NO. 3005

TASK NO. 55

MONITOR: AFOSR, XC
TR-94-0563, AFOSR

UNCLASSIFIED REPORT
EXPORT CONTROL

Distribution authorized to U.S. Gov't. agencies and their contractors; Critical Technology; Aug 94. Other requests shall be referred to AFOSR/PKA, 110 Duncan Ave., Suite B115, Bolling AFB, Washington, DC 20332-0001. This document contains export-controlled technical data.

ABSTRACT: (U) Several second order nonlinear optical (NLO) materials based on 4-nitrophenyl-2-pyrrolidinemethanol (NPP) chromophore have been synthesized, and one was incorporated covalently to poly-(parahydroxy)-styrene polymer. All ten synthetic steps for the production of 4-(bis(2-hydroxyethyl)amino)-4'-((6-methacryloylhex yl)-sulfonyl) azobenzene, covalently incorporated into a polymethylmethacrylate (PMMA) polymer matrix, have been checked and verified. Several modifications have been made in the synthetic procedure to yield approximately 5g per batch of the monomer NLO and its conversion to the PMMA polymer. An alternate synthetic route for one of the important intermediate 4-aminophenyl-(6-hydroxyhexyl)-sulfone, has been proposed. Preliminary experiments indicated considerable savings in time an processing procedure. A new method for investigating volatile materials during their thermal stability studies by the DSC technique has been developed and the sealed ampoule technique was optimized

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-B189 822 CONTINUED

DESCRIPTORS: (U) *NONLINEAR OPTICS, *OPTICAL MATERIALS, *POLYMERS, MATRIX MATERIALS, CHROMOPHORES, THERMAL STABILITY, AGING(MATERIALS), AMINO PLASTICS, VOLATILITY, PURIFICATION, MONOMERS, ANILINES, DIAZO COMPOUNDS, ACRYLATES.

IDENTIFIERS: (U) EXPORT CONTROL, PE61103D, WUAFOSR300555.

AD-A286 577 20/6 20/14 20/1 21/2

NEW MEXICO STATE UNIV LAS CRUCES DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) On Modeling Nonlinear Optical Mixing Processes in Droplets,

93 14P

PERSONAL AUTHORS: Hill, Steven C.; Chang, Richard K.

CONTRACT NO. AFOSR-91-0150

PROJECT NO. 2308

TASK NO. CS

MONITOR: AFOSR, XC
TR-94-0735, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Proceedings of the SPIE Conference on Laser Applications in Combustion and Combustion Diagnostics, v1862 p309-321 1993. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) We have recently modeled third-order sum-frequency generation (TSFG) in droplets J. Opt. Soc. Am. B 9, (1993). The basic approach is similar to the model developed by Cooney and Gross (Opt. Lett., 7, 218 (1982)) for coherent anti-Stokes Raman scattering (CARS) from droplets. In this model, three generating waves interact to generate a third-order nonlinear polarization, which then radiates inside the sphere as described by the model of H. Chew et al., Phys. Rev. A, (1976). The intensity of the output waves at the sum frequency is proportional to the spatial overlap (amplitude and phase) of the nonlinear polarization with the output resonance of the droplet cavity mode, and to the integral of the products of the frequency dependence of the nonlinear polarization and the output resonance mode. Here we review our approach to modeling TSFG in droplets, discuss second-order sum frequency generation (SSFG) and CARS in droplets, stressing the similarities and differences among TSFG, SSFG, and CARS in droplets, and discuss the possible application of these mixing processes for fuel droplet characterization. We note that TSFG and SSFG from droplets are too weak to be useful for fuel droplet

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A286 577 CONTINUED

characterization, but that CARS is readily detectable from droplets and may be useful for determining the concentrations of chemical species in fuel droplets. Third-harmonic generation, Microdroplets, Nonlinear optics, Stimulated raman scattering, Spatial overlap, Phase, Matching conditions.

DESCRIPTORS: (U) *DROPS, *MIXING, *NONLINEAR OPTICS, *COMBUSTION, AMPLITUDE, CAVITIES, CHEMICALS, FREQUENCY, WAVES, RAMAN SPECTRA, FUELS, INTEGRALS, INTENSITY, MATCHING, MODELS, OUTPUT, LASERS, PHASE, POLARIZATION, RESONANCE, SCATTERING, SPHERES, REPRINTS, THIRD HARMONIC GENERATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308CS, TSFG(Third Order Sum Frequency), CARS(Coherent Anti-Stokes Raman Scattering), *Coherent anti-stokes, Raman scattering, Stimulated raman scattering, Microdroplets, Spatial overlap, Matching conditions.

AD-A286 577

AD-A286 564 5/8

STANFORD UNIV CA DEPT OF PHYSIOLOGY

(U) Spontaneous Discovery and Use of Categorical Structure (Category Invention in Unsupervised Learning).

DESCRIPTIVE NOTE: Annual rept. 15 Jan 93-14 Jan 94,

94 19P

PERSONAL AUTHORS: Bower, Gordon H.; Clapper, John P.

CONTRACT NO. AFOSR-91-0144

PROJECT NO. 2313

TASK NO. BS

MONITOR: AFOSR, XC
TR-94-0722, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Experimental Psychology, Learning Memory and Cognition, n2 P443-460 1994. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The research project has as its goal the conduct of several experiments to examine people's ability to spontaneously classify and organize a large database of examples when no external tutor is there to inform them of the optimal organization. Throughout several experiments we developed and tested three different, indirect measures of people's category learning. One set of those experiments led to a report published in the Journal of Experimental Psychology: Learning, Memory, and Cognition. Copies of that published paper are enclosed. In addition, further experiments were conducted which yielded useful confirmatory results. These results are currently being written up to be submitted for publication. The period of the grant has been extended without cost to October 15, 1994. The more recent research will be reported in the final report on the project due by December 15, 1994.

DESCRIPTORS: (U) *ATTENTION, *LEARNING, COGNITION, EXPERIMENTAL PSYCHOLOGY, MEMORY(PSYCHOLOGY).

IDENTIFIERS: (U) PE61102F, WUAFOSR2313BS, Category,

AD-A286 564

AD-A286 564 CONTINUED

Concept

AD-A286 563 6/4 20/1

LOYOLA UNIV OF CHICAGO IL PARMLY HEARING INST

(U) Determination of Multiple Sound Sources.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 93-31 Aug 94,

AUG 94 11P

PERSONAL AUTHORS: Yost, William A.; Sheft, Stanley; Dye, Raymond

CONTRACT NO. F49620-92-J-0489

PROJECT NO. 2313

TASK NO. AS

MONITOR: AFOSR, XC
TR-94-0713, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The results studied showed that the SALT procedure produced weights that were much more consistent with subject reports than threshold measures. That is, the change in weights with increasing stimulus duration for the lateralization task indicated that the tones become more separable (analytic listening) as the overall duration increases. This does not occur with traditional measures of thresholds. In the amplitude modulation task, the modulated tones become more separable (analytic listening) as the modulation rates of the targets and distractor differ. Again traditional measures using thresholds do not show the same trend. Subjects also report that the modulated tones are different when the rates differ.

DESCRIPTORS: (U) *AUDITORY PERCEPTION, *ACOUSTIC ATTENUATION, SPEECH RECOGNITION, HEARING, RESPONSE(BIOLOGY), LOUDSPEAKERS, PERFORMANCE(HUMAN).

IDENTIFIERS: (U) Sound sources, Multiple sources, PE61102F, WUAFOSR2313AS

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A286 562 7/3 7/4 11/6 7/2

NORTHEASTERN UNIV BOSTON MA

(U) Novel Reagents for Chemical Vapor Deposition of Intermetallic Alloys.

DESCRIPTIVE NOTE: Final rept. Apr 91-Aug 94,

OCT 94 11P

PERSONAL AUTHORS: Kirss, Rein U.

CONTRACT NO. AFOSR-91-0207

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XC
TR-94-0723, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Reactions of Hf(CH2SiMe3)4 with AlMe3 proceeded by formation of covalently bonded heterobimetallic intermediates with no alkyl exchange. Reaction with AlH3.NMe3 yielded Al(Ch2SiMe3)3. NMe3 and 'Hf(CH2SiMe3)H3'. Carbon blocks coated with this mixture produced a HfAlC2 coating which was effective in protecting the substrate from air oxidation at high temperatures.

DESCRIPTORS: (U) *INTERMETALLIC COMPOUNDS, *CHEMICAL VAPOR DEPOSITION, *ALLOYS, SILICON, HAFNIUM, CHEMICAL REACTIONS, METHYL RADICALS, METAL COATINGS, COVALENT BONDS, NITROGEN, BIMETALS, CARBON, SUBSTRATES, AIR, OXIDATION, PROTECTION, HIGH TEMPERATURE, MOLECULAR PROPERTIES, PRECURSORS, TERNARY COMPOUNDS, COMPOSITE MATERIALS, TRANSITION METALS, EXCHANGE REACTIONS, ALKYL RADICALS.

IDENTIFIERS: (U) WUAFOSR2303B2, Reagents, Aluminum Carbides

AD-A286 560 5/8

BOSTON UNIV MA

(U) Neural Models of Motion Perception.

DESCRIPTIVE NOTE: Annual technical rept. 1 Sep 93-31 Aug 94,

NOV 94 9P

PERSONAL AUTHORS: Grossberg, Stephen; Mingolla, Ennio

CONTRACT NO. F49620-92-J-0334

PROJECT NO. 3484

TASK NO. S4

MONITOR: AFOSR, XC
TR-94-0720, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Six research projects supported by this grant during the reporting period have resulted in one published book chapter, one refereed article in press, two articles under review, and five conference publications. Areas of research included design and simulation of network architectures for: (1) spatial pooling and perceptual framing by synchronized cortical dynamics; (2) synthetic aperture radar processing by a multiple scale; (3) formation of cortical maps of ocular dominance and orientation columns; (4) a neuron model with variable ion concentrations; (5) a multi-scale model of brightness perception; and (6) models of motion perception.

DESCRIPTORS: (U) *PERCEPTION(PSYCHOLOGY), *MOTION, NEURAL NETS, SPATIAL DISTRIBUTION, RADAR, ADRENAL CORTEX.

IDENTIFIERS: (U) WUAFOSR3484S4.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A286 557 9/5 20/6 20/2

NOTTINGHAM UNIV (UNITED KINGDOM) DEPT OF GEOGRAPHY

(U) High Contrast Organic Crystal Optical Modulator for Phased Array Antenna and Optical Signal Processing.

DESCRIPTIVE NOTE: Final rept. 1 Sep 91-31 Aug 94,

OCT 94 55P

PERSONAL AUTHORS: Stewart, K. R.; Boden, E. P.; Yakymyshyn, C. P.; Lotshaw, W. T.

CONTRACT NO. F49620-91-C-0075

PROJECT NO. 8146

TASK NO. 08

MONITOR: AFOSR, XC
TR-94-0749, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The utility of organic salts related to 4-Dimethylamino-N-methyl Stilbazolium Tosylate, DAST, to display very useful optoelectronic properties has been broadly investigated and continues to yield new information. New materials have been developed having improved optical and physical properties. Methods for crystal growth and handling have been developed which allow the design and fabrication of useful optoelectronic devices. Design and fabrication of a linear array of high performance Fabry-Perot etalons is described. DAST, Fabry-Perot etalon, Optical modulator, Organic NLO materials.

DESCRIPTORS: (U) *ELECTROOPTICS, *OPTICAL PROCESSING, *LIGHT MODULATORS, CRYSTAL GROWTH, FABRICATION, PHASED ARRAYS, LINEAR ARRAYS, FABRY PEROT INTERFEROMETERS, SINGLE CRYSTALS, SALTS, SYNTHESIS, OPTICAL PROPERTIES, CRYSTAL STRUCTURE, NONLINEAR OPTICS.

IDENTIFIERS: (U) WUAFOSR814608, PE61101E, DAST(Dimethylamino N Methyl Stilbazolium Tosylate).

AD-A286 557

AD-A286 551 6/11 6/3

OKLAHOMA STATE UNIV STILLWATER DEPT OF ZOOLOGY

(U) Wild Mammalian Biomonitors for Assessing Impacts of Environmental Contamination on Population and Community Ecology.

DESCRIPTIVE NOTE: Final technical rept. 1 Jun 91-31 Oct 94,

OCT 94 48P

PERSONAL AUTHORS: Lochmiller, R. L.

CONTRACT NO. AFOSR-91-0316

PROJECT NO. 3484

TASK NO. D7

MONITOR: AFOSR, XC
TR-94-0706, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The overall objective of this research project was to explore the use of in situ biomonitoring using wild mammalian animal models to assess ecotoxicity risks from petrochemical contaminants. We approached this objective by comparing the relative sensitivities of selected measures of metabolic, immunologic, genetic, and histopathologic toxicity (multiparameter model) in small-mammalian residents of terrestrial ecosystems contaminated with complex mixtures of petrochemicals (an abandoned oil refinery complex). Multiparameter response profiles of small mammals were evaluated relative to results from common laboratory bioassay tests (fathead minnow survival, rice seed germination test, etc.) and soil chemical analyses to determine their ability to predict ecotoxicity risks (as indexed by demographic changes in the small mammal community). Our principal in situ biomonitor was the cotton rat (Sigmodon hispidus), which is the dominant member of the small mammal community on 3 uncontaminated reference and 3 heavy metal-petrochemical contaminated study sites. Chemical analyses of soil and soil extracts identified a variety of heavy metal and organic contaminants on the 3 suspected toxic study sites, which was reflected in common laboratory bioassay results using fathead minnow, microtox, rice

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A286 551 CONTINUED

seed germination, and Ceriodaphnia assays. Environmental toxicology, Biomonitor, Ecotoxicity, Risk assessment.

DESCRIPTORS: (U) *CONTAMINANTS, *HEAVY METALS, *MAMMALS, *TOXICITY, *MONITORS, ANIMALS, BIOASSAY, CELLS, CHEMICALS, COMMUNITIES, COTTON, DENSITY, ECOSYSTEMS, ESTIMATES, FLUORIDES, FUNCTIONS, GENETICS, GERMINATION, IMMUNITY, LABORATORIES, LESIONS, MARKERS, MEASUREMENT, MINNOWS, MIXTURES, MODELS, OILS, POPULATION, PROFILES, RATIOS, RATS, REFINERIES, REPRODUCTION, RESPONSE, RISK, SEEDS, SENSITIVITY, SEX, SITES, SOILS, TEST AND EVALUATION, TOXICOLOGY, IMMUNOLOGY, MEDICAL RESEARCH.

IDENTIFIERS: (U) PE61103D, WUAFOSR3484D7, LPN-AFOSR-90-NL-254, In situ, Sigmodon hispidus, *Ecotoxicity, Biomonitor.

AD-A286 551

AD-A286 541 7/6 20/3 11/9 7/3

MCDONNELL DOUGLAS AEROSPACE ST LOUIS MO

(U) Conducting Thermoset Polymers.

DESCRIPTIVE NOTE: Annual technical rept. 1 Oct 93-30 Sep 94,

OCT 94 44P

PERSONAL AUTHORS: Brown, I. M.; Leopold, D. J.; Sandreczki, T. C.

REPORT NO. MDC-94X0025

CONTRACT NO. F49620-92-C-0074

PROJECT NO. 2303

TASK NO. CS

MONITOR: AFOSR, XC
TR-94-0711, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Continuing efforts to develop conducting thermoset polymers in which the Pi-conjugation extends along the backbone and through the crosslink are described. Acetylene terminated Schiff bases, acetylene-terminated polythiophenes and acetylene-terminated polyanilines are being investigated. Two different approaches to get these thermosets conducting are being pursued: in the AT-Schiff bases and AT-polythiophenes the monomers are first cured then doped with iodine, whereas in the AT-polyanilines the oligomers are first doped with protonic acids then cured. Electron spin resonance, photoluminescence and photo-absorption data suggest that polarons can form in the doped and undoped forms of the AT-Schiff bases and AT-polythiophenes. The dependences of the ESR lineshape parameters of the AT-Schiff bases and amine-cured epoxies on iodine content can be explained in terms of a model involving equilibria between polymeric radical cation complexes containing different stoichiometric amounts of iodine. Several AT-polyanilines oligomers containing either alkoxy substituents or meta substitution in the backbones were synthesized in order to improve the possibility of thermosets. These oligomers were doped with different organic acids. The maximum

AD-A286 541

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conductivity value measured was 2 x 10 (exp -2) S/cm. Conducting polymer, Thermoset, Acetylene-terminated Schiff base, Acetylene-terminated polythiophene, Acetylene-terminated polyaniline, p-type dopant, Acid dopant, Electron spin resonance.

DESCRIPTORS: (U) *CONDUCTIVITY, *THERMOSETTING PLASTICS, *POLYMERS, ABSORPTION, ACETYLENES, CATIONS, CROSSLINKING(CHEMISTRY), ELECTRON SPIN RESONANCE, IODINE, MODELS, MONOMERS, CURING, OLIGOMERS, ORGANIC ACIDS, PARAMETERS, PHOTOLUMINESCENCE, DOPING, AMINES, EPOXY COMPOUNDS, RESONANCE, CHEMICAL EQUILIBRIUM, CHEMICAL RADICALS, ANILINES, THIOPHENES, MECHANICAL PROPERTIES, PROCESSING, ELECTRICAL CONDUCTIVITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303CS, Schiff bases, Polythiophenes, Polyanilines, Protonic acids, Polarons, AT(Acetylene Terminated), VT(Vinyl Terminated).

AD-A286 529 25/2 4/1 20/14 20/9

BOSTON UNIV MA

(U) Source Mechanisms and Radio Effects of Ionospheric Plasma Disturbances.

DESCRIPTIVE NOTE: Final rept. 1 Oct 91-30 Sep 94,

SEP 94 7P

PERSONAL AUTHORS: Lee, Min-Chang

CONTRACT NO. F49620-92-J-0001

PROJECT NO. 2310

TASK NO. BS

MONITOR: AFOSR, XC
TR-94-0744, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Research on source mechanisms and radio effects of ionospheric plasma disturbances had been conducted, including theories, field experiments at Arecibo, Puerto Rico, and laboratory experiments with the Versatile Toroidal Facility (VTF) at MIT Plasma Fusion Center. Several graduate students and undergraduate students participated in the research projects and completed their thesis work under the supervision of Prof. Min-Chang Lee

DESCRIPTORS: (U) *RADIO WAVES, *IONOSPHERIC DISTURBANCES, BACKSCATTERING, ELECTROMAGNETIC WAVE PROPAGATION, PLASMAS(PHYSICS), TURBULENCE, LOW FREQUENCY, LIGHTNING, RADAR CORRELATION, PLASMA WAVES, RADIO TRANSMISSION, IONOSPHERIC PROPAGATION.

IDENTIFIERS: (U) WUAFOSR2310BS.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A286 527 7/4 20/5 7/3 7/2

COLORADO UNIV AT BOULDER

(U) Bond-Forming Reactions of Gas-Phase Molecular Dications,

OCT 94 9P

PERSONAL AUTHORS: Price, Stephen D.; Manning, Michelle; Leone, Stephen R.

CONTRACT NO. F49620-92-J-0071

MONITOR: AFOSR, XC
TR-94-0714, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of American Chemical Society, V116 p8673-8680, 5 Oct 94. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) We observe a series of novel reactions involving the formation of chemical bonds in a comprehensive study of the reactivity of eight dications, CF(2+), CF2(2+), CF3(2+), SF4(2+), SF3(2+), SF2(2+), CO2(2+), and OCS(2+), with the neutral collision partners Xe, D2, O2, N2, NO, and CO. The reactions are detected in a crossed beam apparatus at laboratory frame collision energies between 30 and 50 eV. The mass-selected dication beam interacts with a pulsed beam of the neutral reactant in a collision region and the ionic products are monitored by a time-of-flight mass spectrometer. The major reactions for each system are charge transfer processes. However, reactions involving the formation of new chemical bonds contribute significantly to the ion yield (1-20%) for several of the collision systems studied. Two classes of bond-forming reactions are observed, one involving negative ion transfer to the dication and the other involving positive ion transfer from the dication to the neutral reactant. An example of the former is the production of DCF2(+) from the reaction between CF2(2+) and D2; an example of the latter is the production of XeF(+) from the reaction between CF2(2+) and Xe. Estimates of the appropriate curve-crossing radii for the negative ion transfer reactions give values consistent with a Landau-Zener curve-crossing mechanism. Charge transfer products and collision-induced neutral loss channels are also reported in this study.

AD-A286 527

AD-A286 527 CONTINUED

DESCRIPTORS: (U) *CHEMICAL BONDS, *CATIONS, CHANNELS, CHARGE TRANSFER, CHEMICALS, COLLISIONS, CROSSINGS, ESTIMATES, IONS, MASS SPECTROMETERS, NEUTRAL, PRODUCTION, REACTIVITIES, TRANSFER, CHEMICAL REACTIONS, GAS FLOW, PHASE, MOLECULAR PROPERTIES, REPRINTS, XENON, OXYGEN, DEUTERIUM, NITROGEN, HYDROCARBONS, FLUORIDES, SULFUR.

IDENTIFIERS: (U) *Dications, Time of flight

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A286 526 6/1 7/4

HARVARD UNIV CAMBRIDGE MA

(U) Microbial Degradation of Polymers Used in Electronics.

DESCRIPTIVE NOTE: Annual rept.,

OCT 94 4P

PERSONAL AUTHORS: Mitchell, Ralph

CONTRACT NO. F49620-92-J-0254

PROJECT NO. 3484

TASK NO. S2

MONITOR: AFOSR, XC
TR-94-0724, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) In a continuation of our work on the biodegradation of polyurethane we are identifying and classifying new organisms isolated from enrichment cultures of polyurethane-contaminated soil from disposal sites. During the past year we have isolated in pure culture a number of bacteria and fungi capable of degrading polyurethane. We are in the process of identifying these microorganisms.

DESCRIPTORS: (U) *BIODETERIORATION, *FUNGI, *POLYURETHANE RESINS, *CONTAMINANTS, *GAS CHROMATOGRAPHY, BACTERIA, CULTURES(BIOLOGY), DISPOSAL, ENRICHMENT, MICROORGANISMS, NUMBERS, SITES, SOILS, WORK, SPECTROSCOPY.

IDENTIFIERS: (U) PE61103D, WUAFOSR3484S2.

AD-A286 525 12/5 13/9

MICHIGAN UNIV ANN ARBOR

(U) Next Generation Solid Modellers for Electronic Prototyping.

DESCRIPTIVE NOTE: Final rept. 15 Feb 93-14 Feb 94,

JUL 94 5P

PERSONAL AUTHORS: Dutta, Debasish; Gunzburger,

CONTRACT NO. F49620-93-1-0149

PROJECT NO. 2304

TASK NO. DS

MONITOR: AFOSR, XC
TR-94-0745, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) In this research project, we are focusing on expanding the geometric coverage of solid modellers such that a wider variety of objects can be modelled accurately. Solid modellers are large computer programs that enable a designer to construct, interrogate and manipulate computer models of physical objects. They are at the core of every computer system for engineering analysis, prototyping, manufacture and inspection. Various manufacturing tasks can be simulated in the computer and electronic mock-ups (i.e., prototypes) can be created prior to actual manufacture.

DESCRIPTORS: (U) *COMPUTER PROGRAMS, *COMPUTERIZED SIMULATION, *MODEL THEORY, PROTOTYPES, MECHANICAL ENGINEERING, THREE DIMENSIONAL.

IDENTIFIERS: (U) Solid modellers, Cyclides, PE61102F, WUAFORS2304DS

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A286 524 9/6 20/6 20/1

CALIFORNIA INST OF TECH PASADENA

(U) Laser-Induced Thermal Acoustics (LITA): Four-Wave Mixing Measurement of Sound Speed, Thermal Diffusivity, and Viscosity,

AUG 94 11P

PERSONAL AUTHORS: Cummings, Eric B.

CONTRACT NO. F49620-93-1-0338

PROJECT NO. 3484

TASK NO. AS

MONITOR: AFOSR, XC
TR-94-0738, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Proceedings of the International Conference of Lasers (1993), SOQUE, McLean, VA.

ABSTRACT: (U) Laser-induced thermal acoustics (LITA) is a promising optical four-wave mixing technique for gasdynamic measurement. The X(3) nonlinear process is a sequence of two opto-acoustic effects, electrostriction and absorption/rapid-thermalization, and the acousto-optic effect. The evolution of the laser-induced acoustic structures temporally modulates X(3) and thereby the LITA signal. Time resolution of the signal provides the sound speed, thermal diffusivity, and acoustic damping rate, along with information about atomic or molecular energy transfer rates. LITA can also measure spectra of both the real and imaginary gas susceptibility. The physics of LITA is discussed and the derivation is sketched of a simple analytical expression that accurately describes both the magnitude and time history of the LITA signal. Early experimental results are presented. Sound speeds accurate to 0.5% and transport properties accurate to 30% have been measured in a single-shot without calibration. More realistic modeling should dramatically improve transport-property measurement. LITA spectra have been taken of weak spectral lines of NO2 in concentrations less than 50 ppb. Signal reflectivities as high as 0.0001 have been estimated. New applications of LITA, including velocimetry, are suggested. LITA, Four-wave mixing, Thermal grating, Single-shot measurement, Velocimetry.

AD-A286 524 CONTINUED

DESCRIPTORS: (U) *ACOUSTOOPTICS, *FOUR WAVE MIXING, CALIBRATION, DAMPING, DIFFUSIVITY, SOUND WAVES, VISCOSITY, ELECTROSTRICTION, ENERGY TRANSFER, NITROGEN DIOXIDE, ACOUSTIC SCATTERING, GAS DYNAMICS, THERMAL DIFFUSION, VELOCIMETERS, GRATINGS(SPECTRA), RESOLUTION, OPTOACOUSTIC FILTERS, EXPERIMENTAL DATA, SPECTRAL LINES, TRANSPORT PROPERTIES.

IDENTIFIERS: (U) PE61103D, WUAFOSR3484AS, *LITA(Laser Induced Thermal Acoustics).

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A286 523 20/4 20/13 7/4

CALIFORNIA INST OF TECH PASADENA

(U) Nonequilibrium Recombination after a Curved Shock Wave,

DEC 93 9P

PERSONAL AUTHORS: Wen, Chihyung Y.; Hornung, Hans G.

CONTRACT NO. F49620-93-1-0338

PROJECT NO. 3484

TASK NO. AS

MONITOR: AFOSR, XC
TR-94-0728, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Proceedings of the Pacific International Conference on Aerospace Science and Technology (1st), v2 p639-647 Dec 93. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The effect of nonequilibrium recombination after a curved two-dimensional shock wave in a hypervelocity dissociating flow of an inviscid Lighthill-Freeman gas is considered. Analytic solutions are obtained with the effective shock values derived by Hornung and the assumption that the flow is quasi-frozen after a thin dissociating layer near the shock. The solution gives the expression of dissociation fraction as a function of temperature on a streamline It can then provide a rule of thumb to check the validity of binary scaling for the experimental conditions and a tool to determine the limiting streamline which delineates the validity zone of binary scaling. The effects upon the nonequilibrium chemical reaction of the large difference in free stream temperature between free-piston shock tunnel and equivalent flight conditions are discussed. Numerical examples are presented and the results are compared with solutions obtained with two-dimensional Euler equations using Candler's code. Hypervelocity flow, Real gas effects, Binary scaling, Lighthill-Freeman gas, Free-piston shock tunnel.

DESCRIPTORS: (U) *SHOCK WAVES, *NONEQUILIBRIUM FLOW, DISSOCIATION, IDEAL GAS LAW, MACH NUMBER,

AD-A286 523 CONTINUED

AEROTHERMODYNAMICS, EQUATIONS OF MOTION, EULER EQUATIONS, FREE STREAM, CHEMICAL EQUILIBRIUM, TEMPERATURE GRADIENTS, SHOCK TUNNELS, HYPERSONIC FLOW, RECOMBINATION REACTIONS, TWO DIMENSIONAL, AIR FLOW, INVISCID FLOW, GAS DYNAMICS, STAGNATION TEMPERATURE, PRESSURE GRADIENTS, REPRINTS.

IDENTIFIERS: (U) PE61103D, WUAFOSR3484AS, Real gas effects.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A286 522 20/5 20/6

YALE UNIV NEW HAVEN CT DEPT OF APPLIED PHYSICS

(U) Detection of Minority Species in Microdroplets: Enhancement of Stimulated Raman Scattering,

DEC 93 2P

PERSONAL AUTHORS: Kwok, Alfred S.; Chang, Richard K.

CONTRACT NO. AFOSR-91-0150

PROJECT NO. 2308

TASK NO. CS

MONITOR: AFOSR, XC
TR-94-0726, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Optics and Photonics News, p34 Dec 93. Available only to DTIC users. No copies furnished by NTIS

ABSTRACT: (U) Spontaneous Raman scattering has served as a useful spectroscopic technique since its discovery. However, the weak signal prevents its application in dynamic environments. Moreover, the Raman spectrum can be overwhelmed by fluorescence from even trace impurities. Stimulated Raman scattering (SRS) is intense, but a minimum sample length is needed to provide the Raman gain. SRS is useful only in detecting majority species because of depletion of the pump laser by the SRS from the strongest-gain Raman mode.

DESCRIPTORS: (U) *LIGHT SCATTERING, *RAMAN SPECTROSCOPY, AEROSOLS, SPRAYS, DROPS, FLUORESCENT DYES, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308CS, Raman scattering, Stimulated Raman scattering, Microdroplets

AD-A286 521 21/4 7/4 9/3 20/6

YALE UNIV NEW HAVEN CT DEPT OF APPLIED PHYSICS

(U) Laser Diagnostic Techniques for Characterizing Droplet Size, Composition, and Differential Evaporation in Fuel Sprays,

92 8P

PERSONAL AUTHORS: Serpenguzel, A.; Chang, Richard K.; Acker, W. P.; Sung, R. L.

CONTRACT NO. AFOSR-91-0150

PROJECT NO. 2308

TASK NO. CS

MONITOR: AFOSR, XC
TR-94-0725, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in the Institution of Mechanical Engineers, C389/417, n925030 p107-112 1992. Available only to DTIC users. No copies furnished by NTIS

ABSTRACT: (U) An in-situ laser diagnostic technique based on simulated Raman scattering (SRS) from monodispersed droplets is presented. The SRS technique has been applied to determine the evaporation rates of two-component fuel droplets which are heated downstream from a droplet injector. (Author)

DESCRIPTORS: (U) *FUEL SPRAYS, *EVAPORATION, *LASERS, DROPS, SIZES(DIMENSIONS), REPRINTS, RATES, RESONANCE, NONLINEAR OPTICS, CAVITIES, SHIFTING, EMISSION, INJECTION, DIESEL ENGINES, NITROGEN OXIDES, DIAGNOSTIC EQUIPMENT.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308CS, Differential, *Droplets, Morphology dependent resonances, *Composition, SRS(Stimulated Raman Scattering), Stimulated Raman scattering.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A286 515 1/4 22/3

MICHIGAN UNIV ANN ARBOR DEPT OF AEROSPACE ENGINEERING

(U) Robust Fixed-Structure Control.

DESCRIPTIVE NOTE: Final rept. 1 Feb 92-30 Sep 94,

OCT 94 27P

PERSONAL AUTHORS: Bernstein, Dennis S.

CONTRACT NO. F49620-92-J-0127

MONITOR: AFOSR, XC
TR-94-0741, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This final report for AFOSR Grant F49620-92-J-0127 summarizes results obtained in five areas, namely, robust control, linear control, sampled-data control, tracking and disturbance rejection, and nonlinear control. Principal results include new bounds for the structured singular value, implementation of structured singular value synthesis using fixed-structure optimization techniques, a more rigorous foundation for the Maximum Entropy control technique, extensions of linear-quadratic control to stable stabilizing controllers, determination of the achievable performance of sampled-data controllers in the presence of sample-rate constraints, control of noise in an acoustic duct, stability theory for second-order systems, a rigorous treatment of Guyan reduction, a deterministic foundation for energy flow theory, a unified treatment of quadratic optimality and servo-compensation, nonlinear control of the spinning top and rotating bodies with known and unknown mass imbalance, global stabilization of the oscillating eccentric rotor using integrator backstepping, and Lyapunov theory for finite-time convergence. feedback control, Robustness, Nonlinear systems, Dynamics.

DESCRIPTORS: (U) *CONTROL SYSTEMS, *STABILIZATION SYSTEMS, *ATTITUDE CONTROL SYSTEMS, ACOUSTICS, CONVERGENCE, LYAPUNOV FUNCTIONS, DUCTS, ENTROPY, FEEDBACK, AIR FORCE RESEARCH, INTEGRATORS, MASS, NOISE, NONLINEAR SYSTEMS, OPTIMIZATION, ROTORS, STABILITY, STABILIZATION, TRACKING.

IDENTIFIERS: (U) Robust control.

AD-A286 515

AD-A286 514 20/1 20/6

NORTH CAROLINA UNIV AT CHARLOTTE DEPT OF MATHEMATICS

(U) Localization Phenomenon in Some Random Classical Systems.

DESCRIPTIVE NOTE: Final rept. 1 Jun 91-31 May 94,

JUL 94 4P

PERSONAL AUTHORS: Figotin, Alexander

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR, XC
TR-94-0748, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) For the reported period the researchers focused on several problems on the propagation of electromagnetic and acoustic waves in periodic and disordered media. (1) Localization properties of some discrete models for light, (2) Existence of gaps and exponential localization for the Anderson type models for periodic and disordered acoustic dielectric media and (3) Band-gap structure for periodic two component dielectric and acoustic media.

DESCRIPTORS: (U) *ACOUSTIC WAVES, *ELECTROMAGNETIC WAVE PROPAGATION, ACOUSTICS, DIELECTRICS, LIGHT, DIELECTRIC PROPERTIES.

AD-A286 514

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A286 508 12/9 12/4

RUTGERS - THE STATE UNIV NEW BRUNSWICK NJ DEPT OF MATHEMATICS

(U) Mathematical Theory of Neural Networks.

DESCRIPTIVE NOTE: Final rept. 1 Aug 91-31 Jul 94,

AUG 94 31P

PERSONAL AUTHORS: Sontag, Eduardo D.; Sussmann, Hector J.

PROJECT NO. 2304

MONITOR: AFOSR, XC
TR-94-0746, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report provides a summary of the grant work by the principal investigators in the area of neural networks. The topics covered deal with: analysis of networks from the viewpoint of analog computational devices, exploring limitations imposed by resource constraints; questions of parameter identification of recurrent nets; use of feedforward nets for function approximation and interpolation problems; systems theory (observability and other properties) for nets; and the use of neural networks for the control of nonlinear systems.

DESCRIPTORS: (U) *NEURAL NETS, *SYSTEMS ANALYSIS, ANALOGS, IDENTIFICATION, INTERPOLATION, LIMITATIONS, NONLINEAR SYSTEMS, PARAMETERS, CONTROL THEORY, LEARNING MACHINES, FEEDBACK, ARTIFICIAL INTELLIGENCE, COMPUTATIONS, ALGORITHMS, APPROXIMATION(MATHEMATICS), MATHEMATICAL MODELS, MATHEMATICAL LOGIC.

IDENTIFIERS: (U) PE61102F.

AD-A286 508

AD-A286 507 20/4 20/13

CALIFORNIA INST OF TECH PASADENA

(U) Shock Wave Interactions in Hypervelocity Flow,

AUG 94 10P

PERSONAL AUTHORS: Sanderson, S. R.; Sturtevant, B.

CONTRACT NO. F49620-93-1-0338

PROJECT NO. 3484

TASK NO. AS

MONITOR: AFOSR, XC
TR-94-0727, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The impingement of shock waves on blunt bodies in steady supersonic flow is known to cause extremely high local heat transfer rates and surface pressures. Although these problems have been studied in cold hypersonic flow, the effects of dissociative relaxation processes are unknown. In this paper we report a model aimed at determining the boundaries of the possible interaction regimes for an ideal dissociating gas. Local analysis about shock wave intersection points in the pressure-flow deflection angle plane with continuation of singular solutions is the fundamental tool employed. Further, we discuss an experimental investigation of the nominally two-dimensional mean flow that results from the impingement of an oblique shock wave on the, leading edge of a cylinder. The effects of variations in shock impingement geometry were visualized using differential interferometry. Generally, real gas effects are seen to increase the range of shock impingement points for which enhanced heating occurs. They also reduce the type 4 interaction supersonic jet width and influence the type 2-3 transition process. Shock-on-shock interaction, Shock impingement, Hypervelocity flow, Dissociation, Relaxation, Heat transfer.

DESCRIPTORS: (U) *HYPERSONIC FLOW, *SHOCK WAVES, BLUNT BODIES, DEFLECTION, DISSOCIATION, HEAT TRANSFER, IMPINGEMENT, INTERFEROMETRY, LEADING EDGES, PRESSURE, RELAXATION, SUPERSONIC FLOW, TWO DIMENSIONAL, VARIATIONS,

AD-A286 507

AD-A286 507 CONTINUED

WIDTH, GAS SURFACE INTERACTIONS, BOUNDARY LAYER TRANSITION, STAGNATION POINT, IDEAL GAS LAW, NONEQUILIBRIUM FLOW, FREE STREAM, MACH NUMBER, FLOW VISUALIZATION.

IDENTIFIERS: (U) PE61103D, WUAFOSR3484AS, Real gas effects

AD-A286 503 7/4 7/2 20/5 20/3

COLORADO UNIV AT BOULDER

(U) Solvation of Electronically Excited I(2)-,

OCT 94 26P

PERSONAL AUTHORS: Maslen, P. E.; Papanikolas, J. M.; Faeder, J.; Parson, R.; O'Neil, S. V.

CONTRACT NO. F49620-92-J-0071

MONITOR: AFOSR, XC
TR-94-0715, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v101 p5731-5755, 1 Oct 94. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The interaction potentials between the six lowest electronic states of I2(-) and an arbitrary discrete charge distribution are calculated approximately using a one-electron model. The model potentials are much easier to calculate than ab initio potentials, with the cost of a single energy point scaling linearly with the number of solvent molecules, enabling relatively large systems to be studied. Application of the model to simulation of electronically excited I2(-) in liquids and CO2 clusters is discussed. In a preliminary application, solvent effects are approximated by a uniform electric field. If electronically excited ((2)Pi sub g, 1/2)I2(-) undergoes dissociation in the presence of a strong electric field, the negative charge localizes so as to minimize the total potential energy. However, in a weak field the negative charge localizes in the opposite direction, maximizing the potential energy. Based on a study of the field-dependent potential surfaces, a solvent-transfer mechanism is proposed for the electronic relaxation of ((2)Pi sub g, 1/2)I2(-), in contrast to the conventional view of relaxation via electron transfer.

DESCRIPTORS: (U) *ELECTRONIC STATES, *SOLVATION, *EXCITATION, *ANIONS, COSTS, DISSOCIATION, DISTRIBUTION, ELECTRIC FIELDS, ELECTRON TRANSFER, INTERACTIONS, LIQUIDS, MODELS, MOLECULES, POTENTIAL ENERGY, RELAXATION, SIMULATION, SOLVENTS, SURFACES, TRANSFER, REPRINTS, CHARGED PARTICLES, LINEAR SYSTEMS, CARBON DIOXIDE,

AD-A286 503 CONTINUED

HALIDES, IONS, PHOTODISSOCIATION, ABSORPTION SPECTRA.

IDENTIFIERS: (U) Dihalides, Surface hopping

AD-A286 502 6/13 24/3

IDAHO UNIV MOSCOW CENTER FOR HAZARDOUS WASTE REMEDIATION RESEARCH

(U) In Situ Biodegradation of Nitroaromatic Compounds in Soil.

DESCRIPTIVE NOTE: Final rept. 15 Jun 91-14 Aug 94,

OCT 94 20P

PERSONAL AUTHORS: Crawford, Ronald L.

CONTRACT NO. AFOSR-91-0315

PROJECT NO. 3484

TASK NO. D7

MONITOR: AFOSR, XC
TR-94-0710, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Nitroaromatic compounds, particularly nitrotoluenes used as explosives and nitroaromatic herbicides such as dinoseb, are serious environmental contaminants at industrial locations nationwide. Research performed during the 1970s (15,18) generally indicated that complete biomineralization of 2,4,6-trinitrotoluene (TNT) and similar highly nitrated compounds did not occur. Biological reductions (R-NO2-R-NO-R-NHOH-R-NH2) and polymerization reactions appeared to occur, but actual degradation of aromatic nuclei was not observed. However, this work involved studies of aerobic systems such as activated sludge and thermophilic composts, and pure culture studies of aerobic fungi and bacteria such as pseudomonads. Pure cultures of some anaerobic bacteria such as Veillonella alcalescens (35) were examined, with similar results. Boopathy and Kulpa (2) recently isolated a Desulfovibrio that used TNT as a sole source of nitrogen, producing toluene as-an end product. A Pseudomonas that produced dinitrotoluene-, mononitrotoluene, and toluene from TNT, perhaps by hydride additions was isolated by Duque et al. (10). These are still incomplete degradations of the parent molecule.. Since the Desulfovibrio strain required obligately anaerobic conditions

AD-A286 502 CONTINUED

DESCRIPTORS: (U) *ANAEROBIC BACTERIA, *NITROTOLUENES, *TNT, *BIODETERIORATION, COMPOSTS, CONTAMINANTS, CULTURE, DEGRADATION, EXPLOSIVES, FUNGI, HERBICIDES, HYDRIDES, MOLECULES, NITROGEN, NUCLEI, POLYMERIZATION, PSEUDOMONAS, REDUCTION, SLUDGE, SPIRILLACEAE, TOLUENES, VEILLONELLA, WORK, NITROBENZENES, SOILS, MICROORGANISMS, CARBON, METABOLITES, TRACER STUDIES, BIODEGRADATION, RDX, TEMPERATURE.

IDENTIFIERS: (U) PE61103D, WUAFOSR3484D7, Nitrients

AD-A286 501 6/1 6/5 6/15

GEORGETOWN UNIV WASHINGTON DC SCHOOL OF MEDICINE

(U) The Key Involvement of Poly(ADP-Ribosylation) in Defense Against Toxic Agents: Molecular Biology Studies.

DESCRIPTIVE NOTE: Annual rept. 1 Apr 93-31 Mar 94,

OCT 94 9P

PERSONAL AUTHORS: Smulson, Mark E.

CONTRACT NO. F49620-92-J-0242

PROJECT NO. 2312

TASK NO. AS

MONITOR: AFOSR, XC
TR-94-0709, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Poly(ADP-ribose) polymerase (PADPRP) is a chromatin-bound enzyme which is pivotal in cellular recovery from DNA strand break damage. PADPRP requires DNA for activity; it is significant that the catalytic activity of this enzyme is directly coordinated with the number of DNA strand breaks in DNA, both in vitro as well as in vivo. Thus, poly(ADP-ribosylation) is rapidly modulated in response to environmentally significant DNA-damaging agents; this probably represents the most initial response of the cell to genotoxic damage to the genome. One of the major aims over the past few years of this project has been to establish and characterize cells stably transfected with PADPRP antisense cDNA under the control of an inducible promoter and to establish conditions under which significant depletion of nuclear PADPRP could be achieved. This approach has been particularly successful in assessing the potential roles of poly(ADP-ribosylation) in a variety of biological processes, all involving DNA strand breaks, without the use of non-specific chemical inhibitors. Thus, we have assigned biochemical roles for PADPRP in the recovery of cells with exposure to mutagenic agents, gene amplification and DNA replication.

DESCRIPTORS: (U) *ENZYMES, *BIOCHEMISTRY, *TOXIC AGENTS,

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A286 501 CONTINUED

*DEOXYRIBONUCLEIC ACIDS, AMPLIFICATION, APPROACH, CELLS, CHEMICALS, CHROMATIN, CONTROL, DAMAGE, DEPLETION, GENES, INHIBITORS, GENES, NUMBERS, RECOVERY, RESPONSE, RIBOSE, STRANDS, IN VIVO ANALYSIS, IN VITRO ANALYSIS, DISEASE VECTORS, IONIZING RADIATION, PESTICIDES, RECEPTOR SITES(PHYSIOLOGY), ESCHERICHIA COLI, MUTAGENS, ENVIRONMENTS, AMINO ACIDS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312AS, Polymerase, Catalytic activity.

AD-A286 500 6/11 7/4

DREXEL UNIV PHILADELPHIA PA

(U) Development of Novel Models for Describing Multiple Toxicity Effects.

DESCRIPTIVE NOTE: Annual rept. 20 Sep 92-19 Sep 93,

OCT 94 36P

PERSONAL AUTHORS: Haas, Charles N.; Frank, Maurice J.

CONTRACT NO. AFOSR-91-0428

PROJECT NO. 2312

TASK NO. AS

MONITOR: AFOSR, XC
TR-94-0708, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Illinois Inst. of Technology, Chicago.

ABSTRACT: (U) The objective of this study is to develop more quantitative approaches for the analysis of biological responses to mixtures of toxic materials. The work during the report period focused on developing and extending nonideal modifications to the isobole model for mixture dose-response analysis. Programs to analyze mixture data have been written and used for this purpose. They employ maximum likelihood analysis to the simultaneous determination of dose-response and interaction parameters. The use of spreadsheets to do the same computation has also been investigated, and found promising. -Mis report contains an appendix that enumerates studies from the literature containing mixture dose-response information; many of these studies have been and are currently being used in the project work.

DESCRIPTORS: (U) *RESPONSE(BIOLOGY), *QUANTITATIVE ANALYSIS, *TOXICITY, APPROACH, COMPUTATIONS, DETERMINATION, INTERACTIONS, MATERIALS, MIXTURES, MODELS, MODIFICATION, PARAMETERS, WORK, RISK, DOSE RATE, BIOLOGICAL PRODUCTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312AS.

AD-A286 500

AD-A286 501

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A286 499 20/6 11/4 7/4

PITTSBURGH UNIV PA DEPT OF CHEMISTRY

(U) Novel Materials and Devices from Self-Assembled Periodic Structures.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 93-30 Sep 94,

SEP 94 52P

PERSONAL AUTHORS: Asher, Sanford A.

CONTRACT NO. F49620-93-1-0008

PROJECT NO. 2303

TASK NO. BS

MONITOR: AFOSR, XC
TR-94-0740, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The purpose of this work is to develop highly optically nonlinear CdS quantum dot-SiO2 sphere composites useful for optical switching. The concept is to use these spheres in a BCC array formed from crystalline colloidal arrays. The spheres would normally be refractive index matched to the medium and light would freely transmit. At high light intensities the refractive index of the nonlinear spheres would diverge from the medium and the array would optically pop up to diffract away the high intensity light. The device would act as an optical limiter. Last year's report announced the development of a successful synthesis of these SiO2-CdS sphere composites. During this report period, we refined our process in order to obtain more homogenous and monodisperse products. We have also extended this synthesis to produce several new materials.

DESCRIPTORS: (U) *NONLINEAR OPTICS, *COLLOIDS, *COMPOSITE MATERIALS, ARRAYS, HIGH INTENSITY, LIGHT, SILICON DIOXIDE, DIFFRACTION, LIMITERS, REFRACTIVE INDEX, CADMIUM SULFIDES, SPHERES, SWITCHING, SYNTHESIS, POLYMERS, PATENTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303BS, Nanocomposite materials.

AD-A286 499

AD-A286 498 6/13 24/3

IDAHO UNIV MOSCOW CENTER FOR HAZARDOUS WASTE REMEDIATION RESEARCH

(U) Augmentation to in Situ Biodegradation of Nitroaromatic Compounds in Soil.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 93-31 Aug 94,

SEP 94 8P

PERSONAL AUTHORS: Crawford, Ronald L.

CONTRACT NO. F49620-93-1-0464

PROJECT NO. 3484

TASK NO. YS

MONITOR: AFOSR, XC
TR-94-0707, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) We have determined that an organism able to degrade both RDX and TNT in a pure culture is a strain of Clostridium bifermentans. The consortium from which this organism is derived also degrades these compounds, and we suspect that C. bifermentans is also the responsible organism within that consortium. The bioconversion of RDX and TNT occurs under anaerobic conditions both in the consortium and in pure culture without the need of an added reductant. The presence of co-metabolites speeded these biotransformations.

DESCRIPTORS: (U) *TNT, *BIODETERIORATION, *ANAEROBIC BACTERIA, CLOSTRIDIUM, CONSORTIUMS, CULTURE, METABOLITES, RDX, NITROBENZENES, SOILS, MICROORGANISMS, TRACER STUDIES.

IDENTIFIERS: (U) PE61103D, WUAFOSR3484YS, *Biodegradation, Bioreactor, nitroaromatic compounds.

AD-A286 498

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A286 497 20/3 7/3 20/12 20/2

INDIANA UNIV AT BLOOMINGTON DEPT OF CHEMISTRY

(U) Synthesis, Superconductivity, X-Ray Structure and Electronic Band Structure of Lambda-(BETS)2GaCl4,

94 8P

PERSONAL AUTHORS: Montgomery, L. K.; Burgin, T.; Huffman, J. C.; Ren, J.; Whangbo, M.-H.

CONTRACT NO. F49620-92-J-0534, $NSF-DMR90-23347

PROJECT NO. 3484

TASK NO. RS

MONITOR: AFOSR, XC
TR-94-0717, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Physica C. v219 p490-496 1994.
Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The first superconductor derived from bis(ethylenedithio)tetraselenafulvalene (BETS), gamma(BETS)2GaCl4, possesses a relatively sharp resistive transition with an onset of about 7.5 K and a midpoint of 6 K. Several samples had much broader transitions with higher onsets (> 9 K). Superconductivity was confirmed by AC susceptibility (midpoint 4.5 K, AT = 1 K). Gamma(BETS) 2GaCl4 crystallizes in the monoclinic space group P1, with four BETS units stacked in a zig-zag fashion in the unit cell. Tight-binding band calculations suggest that %-(BETS) 2GaCl4 has both 1-D and 2-D Fermi surfaces, the most prominent feature being a closed hole pocket centered at X accounting for approx. 33% of the first Brillouin zone. These results confirm and extend the recent findings of Kobayashi and coworkers.

DESCRIPTORS: (U) *SUPERCONDUCTIVITY, *X RAYS, *ELECTRONIC STATES, *GALLIUM, *CHLORIDES, *CRYSTALS, BRILLOUIN ZONES, CELLS, FERMI SURFACES, SUPERCONDUCTORS, SURFACES, TRANSITIONS, REPRINTS, SYNTHESIS, BANDWIDTH, STRUCTURES, ETHYLENES, ORGANIC COMPOUNDS.

IDENTIFIERS: (U) Thio, Tetraselenafulvalene, Setenafulvalene, BETS(Bis Ethylenedithio

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A286 496 20/4 12/1

CORNELL UNIV ITHACA NY LAB OF ATOMIC AND SOLID STATE PHYSICS

(U) Fully Developed Turbulent Flows.

DESCRIPTIVE NOTE: Final rept. 1 Oct 90-30 Sep 94,

SEP 94 5P

PERSONAL AUTHORS: Siggia, Eric D.

CONTRACT NO. AFOSR-91-0011

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR, XC
TR-94-0716, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) An analytic theory for the large (passive) scalar derivative skewness for turbulent transport in a mean scalar gradient has been devised using Lie Algebraic methods to solve the Hopf equation. This Reynolds independent skewness strongly contradicts Kolmogorov's theory occurs in shear flows, which are being studied numerically, emphasizing the analogies between scalar and momentum transport.

DESCRIPTORS: (U) *TURBULENT FLOW, MOMENTUM, SKEWNESS, TRANSPORT, COMPUTATIONAL FLUID DYNAMICS, REYNOLDS NUMBER, BOUNDARY LAYER, PARTIAL DIFFERENTIAL EQUATIONS, NONLINEAR ANALYSIS, NUMERICAL ANALYSIS.

IDENTIFIERS: (U) WUAFOSR2304A3, PE61102F, Hopf bifurcation, Shear flow

AD-A286 496

AD-A286 489 20/11 20/5 20/14 20/6

YALE UNIV NEW HAVEN CT DEPT OF APPLIED PHYSICS

(U) Precession of Morphology-Dependent Resonances in Nonspherical Droplets,

FEB 93 4P

PERSONAL AUTHORS: Swindal, J. C.; Leach, David H.; Chang, Richard K.; Young, Kenneth

CONTRACT NO. AFOSR-91-0150

PROJECT NO. 2308

TASK NO. CS

MONITOR: AFOSR, XC
TR-94-0730, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Optics Letters, v18 n3 p191-193, 1 Feb 93. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Temporally and spatially resolved measurements of stimulated Raman scattering from flowing ethanol droplets are presented. The observed temporal oscillations of stimulated Raman scattering from two segments of the droplet rim are 180 deg out of phase and dependent on the azimuthal mode number of the morphology-dependent resonance (MDR). The observed precession of the MDR about the symmetry axis of an oblate droplet is consistent with the angular momentum of the MDR, n, and with perturbation predictions of the frequency splitting of a (2n + 1)-degenerate MDR of a perfect sphere. Stimulated Raman Scattering, Morphology-dependent resonances, Shape distortion, Microdroplets, Angular momentum of resonance modes.

DESCRIPTORS: (U) *MORPHOLOGY, *PRECESSION, *RESONANCE, *DROPS, ANGULAR MOMENTUM, DISTORTION, ETHANOLS, FREQUENCY, MEASUREMENT, OSCILLATION, PERTURBATIONS, PHASE, PREDICTIONS, SCATTERING, SHAPE, SPHERES, SPLITTING, SYMMETRY, REPRINTS, OPTICS, LASER BEAMS, RAMAN SPECTRA.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308CS, Nonspherical droplets, Microdroplets, MDR(Morphology-Dependent

AD-A286 489

AD-A286 489 CONTINUED

Resonances), SRS(Stimulated Raman Scattering), Stimulated Raman Scattering

AD-A286 488 7/4 20/4 20/6 9/3

YALE UNIV NEW HAVEN CT DEPT OF APPLIED PHYSICS

(U) Relative Evaporation Rates of Droplets in a Segmented Stream Determined by Droplet Cavity Fluorescence Peak Shifts,

93 11P

PERSONAL AUTHORS: Chen, Gang; Serpenguzel, Ali; Chang, Richard K.; Acker, William P.

CONTRACT NO. AFOSR-91-0150

PROJECT NO. 2308

TASK NO. CS

MONITOR: AFOSR, XC
TR-94-0729, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in SPIE, v1862, 1993. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The evaporated gas behind each flowing droplet affects the evaporation rate and drag of trailing droplets. For interacting droplets, we present a diagnostic technique that is capable of measuring evaporation-related droplet radius changes and drag-related flow velocity changes. When irradiated by a pump-laser beam, each dye-containing droplet acts as a laser, emitting at discrete wavelengths that corresponding to morphology-dependent resonance of a sphere. Small wavelength shifts in the lasing spectra from each droplet are related to its radius change and hence, the decrease of the droplet volume. For an isolated droplet-stream segment the evaporation rates of trailing droplets behind a lead droplet are determined. Segment droplet stream, Continuous droplet stream, Interacting droplets, Shape distortions, Evaporation rater Inertial effects

DESCRIPTORS: (U) *EVAPORATION, *RATES, *STREAMS, *FLUORESCENCE, *DROPS, *SEGMENTED, *CAVITIES, DISTORTION, DRAG, DYES, LASER BEAMS, LASERS, MORPHOLOGY, PUMPS, RESONANCE, SHAPE, SPECTRA, SPHERES, VELOCITY, VOLUME, PEAK VALUES, INERTIAL SYSTEMS, GASES, OPTICS, SIZES(DIMENSIONS), REPRINTS.

AD-A286 489

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AD-A286 488 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2308CS, MDR(Morphology Dependent Resonances)

AD-A286 487 21/2 7/4 12/7 20/4

GENERAL ELECTRIC CO SCHENECTADY NY RESEARCH AND DEVELOPMENT CENTER

(U) Models for High-Intensity Turbulent Combustion,

94 12P

PERSONAL AUTHORS: Correa, Sanjay M.

CONTRACT NO. F49620-91-C-0072

PROJECT NO. 2308

TASK NO. BS

MONITOR: AFOSR, XC
TR-94-0739, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Computing Systems in Engineering, v5 n2 p135-145, 1994. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Since direct numerical simulation of the Navier-Stokes plus combustion chemistry equations will not be practical in the foreseeable future, models are required for the parameter range of practical interest, i. e., high Reynolds Numbers and a wide range of Damkohler Numbers. Models based on the notion of a flamelet are not appropriate when the turbulence intensity is much greater than the laminar flame speed, but a stochastic model based on the joint pdf of velocity and composition is promising. If the velocity field and inhomogeneities in physical space are ignored in the joint pdf equation, the Partially Stirred Reactor or PaSR model is obtained. The PaSR model has recently been studied in detail. Full chemical schemes are computationally tractable. Because the composition pdf has a large number of dimensions (e.g. , Ns > 20 for methane), finite-element/volume techniques are not viable, but particle-tracking Monte Carlo algorithms work well. An enabling feature of the PaSR is that, with the IEM scalar mixing sub-model, it is well suited to parallel computers. The PaSR can describe the effect of turbulence (coupled to a full kinetic scheme) on combustion, including the behavior of emissions such as NOx and CO, of minor species such as free radicals, and the ignition-extinction bifurcation. Turbulent

AD-A286 487 CONTINUED

combustion, Monte Carlo pdf model, Finite-rate chemistry, Mixing.

DESCRIPTORS: (U) *COMBUSTION, *TURBULENCE, *HIGH INTENSITY, ALGORITHMS, CHEMICALS, CHEMISTRY, COMPUTERS, EMISSION, EXTINCTION, FLAMES, FREE RADICALS, IGNITION, KINETICS, METHANE, MIXING, MODELS, PARAMETERS, PARTICLES, RATES, SIMULATION, TRACKING, TRACTABLE, VELOCITY, VOLUME, REPRINTS, HEAT, GAS TURBINES, FUELS, AIR, CHEMICAL REACTIONS, NAVIER STOKES EQUATIONS, REYNOLDS NUMBER, MONTE CARLO METHOD, NITROGEN OXIDES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308BS, Damkohler numbers, PDF Model, Finite rate chemistry

AD-A286 487

AD-A286 486 20/4 20/13

CALIFORNIA INST OF TECH PASADENA

(U) Hypervelocity Flow Over Spheres. Part 4. Hypersonic Flow,

94 9P

PERSONAL AUTHORS: Hornung, H. G.; Wen, C. Y.; Candler, G. V.

CONTRACT NO. F49620-93-1-0338

PROJECT NO. 3484

TASK NO. AS

MONITOR: AFOSR, XC
TR-94-0736, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Acta Mechanica, v4 p163-170, 1994. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Some aspects of the principle of binary Scaling of hypervelocity flows with chemical reactions are discussed and tested both numerically and experimentally. The experiments, obtained in a new free-piston shock tunnel, show the value and limitations of binary scaling in very good agreement with the numerical computations. The use of spherical models eliminates end-effect problems previously encountered with cylindrical models. Global quantities, such as the bow shock stand-off distance, follow binary scaling very well. The results include differential interferograms and surface heat transfer measurements of nitrogen, air and carbon dioxide flows. Hypervelocity, Dissociation, Shock tunnel, Sphere, Interferometry.

DESCRIPTORS: (U) *HYPERSONIC FLOW, *GAS DYNAMICS, AIR, BOW SHOCK, CARBON DIOXIDE, CHEMICAL REACTIONS, DISSOCIATION, HEAT TRANSFER, INTERFEROGRAMS, INTERFEROMETRY, LIMITATIONS, NITROGEN, SHOCK TUNNELS, SPHERES, FLOW FIELDS, BLUNT BODIES, COMPUTATIONAL FLUID DYNAMICS, ENTHALPY, HEAT FLUX, STAGNATION POINT, EXPERIMENTAL DATA, REPRINTS.

IDENTIFIERS: (U) PE61103D, WUAFOSR3484AS, Real gas

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effects

AD-A286 485 21/2 7/3 7/4 20/12

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF MATERIALS SCIENCE AND ENGINEE RING

(U) Transport Properties of Polycyclic Aromatic Hydrocarbons for Flame Modeling,

94 9P

PERSONAL AUTHORS: Wang, Hai; Frenklach, Michael

CONTRACT NO. AFOSR-91-0129

PROJECT NO. 2308

TASK NO. BS

MONITOR: AFOSR, XC
TR-94-0731, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Combustion and Flame, v96 p163-170, 1994. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) A method for systematic evaluation of the Lennard-Jones parameters for polycyclic aromatic hydrocarbon (PAH) compounds is presented, in which correlations for these parameters are derived using a group contribution technique for critical temperatures and pressures and the Tee-Gotoh-Stewart correlations of corresponding states. The Lennard-Jones self-collision diameters and well depths of 29 PAHs were estimated using this approach and are shown to correlate with the molecular weights of aromatics. The gaseous binary diffusion coefficients of aromatics in common gases were calculated with Chapman-Enskog equation using the estimated Lennard Jones parameters and were found to compare well with the available experimental data and the predictions of one of the most reliable empirical approximations. The effect of ordinary diffusion of PAH species on their predicted concentration profiles in a 20-torr laminar premixed acetylene flame is demonstrated computationally.

DESCRIPTORS: (U) *AROMATIC HYDROCARBONS, *FLAMES, *TRANSPORT PROPERTIES, ACETYLENES, COEFFICIENTS, COLLISIONS, CORRELATION, CRITICAL TEMPERATURE, DIAMETERS,

AD-A286 485 CONTINUED

DIFFUSION, EXPERIMENTAL DATA, MOLECULAR WEIGHT, PREDICTIONS, PRESSURE, PROFILES, TEMPERATURE, REPRINTS, SOOT, DUST.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308BS, *Polycyclic, PAH(Polycyclic Aromatic Hydrocarbons), Lennard - Jones parameters, Well depths

AD-A286 475 5/8 15/6

MARYLAND UNIV COLLEGE PARK LAB FOR PLASMA RESEARCH

(U) Connectionist Models for Intelligent Computation.

DESCRIPTIVE NOTE: Final rept. 1 May 91-30 May 94

JUL 94 9P

PERSONAL AUTHORS: Chen, H. H.; Lee, Y. C.

CONTRACT NO. AFOSR-91-0257

MONITOR: AFOSR, XC
TR-94-0747, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Peacekeeping and humanitarian assistance missions are increasing in frequency and importance in the post-Cold War era. The U.S. military is currently participating in major UN peacekeeping operations in Somalia (Operation Restore Hope) and the former Yugoslavia (Operation Provide Promise). While much is known about soldier stress and adaptation in more conventional military operations, the U.S. military has little experience with peacekeeping missions. How combat-trained units and soldiers adapt to this new role is of critical importance to U.S. ability to contribute positively to such operations, to soldier health and well-being, and to military readiness of U.S. forces. Since October 1992, the U.S. Army in Europe has provided medical care for the 25,000 UNPROFOR (United Nations Protection Forces) soldiers located in the former Yugoslavia. The U.S. Army Medical Research Unit-Europe is conducting human dimensions research on soldier and family coping and adaptation in the medical and support units currently deployed in Croatia. Using a longitudinal approach, the research aims to identify and describe the key sources of stress before, during, and after the 6-month deployment. This project provides a model for conducting human dimensions research in military units deployed on contingency operations.

DESCRIPTORS: (U) *MILITARY OPERATIONS, *SOCIAL PSYCHOLOGY, *PEACETIME, ADAPTATION(PHYSIOLOGY), APPROACH, ARMY, ARMY PERSONNEL, COLD WAR, DEPLOYMENT, EUROPE, FREQUENCY, HEALTH, HUMANS, MEDICAL RESEARCH, MISSIONS, MODELS, NATIONS, OPERATION, PROTECTION, SOMALIA, UNITED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A286 475 CONTINUED

NATIONS, WARFARE, YUGOSLAVIA, STRESS(PSYCHOLOGY).

IDENTIFIERS: (U) *PEACEKEEPING Operations, RESTORE HOPE Operation, PROVIDE PROMISE Operation.

AD-A286 471 23/2 5/8

INSTITUTE FOR THE STUDY OF HUMAN CAPABILITIES BLOOMINGTON IN

(U) Institute for the Study of Human Capabilities.

DESCRIPTIVE NOTE: Final technical rept. 1 Jun 90-31 May 94,

MAY 94 124P

PERSONAL AUTHORS: Watson, Charles S.

CONTRACT NO. AFOSR-90-0215

PROJECT NO. 3484

TASK NO. HS

MONITOR: AFOSR, XC
TR-94-0721, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) During the final year of the award we devoted considerable time to an evaluation of the Institute's activities during its first years of operation. A great deal has been accomplished, as described in this report and the annual reports that preceded it. It was recognized in our final evaluation of the Institutes accomplishments, however, that the central theme of 'human capabilities' to too broad to accurately represent the range of research conducted by our associated investigators. There is a need to identify more precisely the specific practical area or areas of science to which our research is applicable. Partly as a result of consultation with one of our visiting scientist, Dr Gilbert Ricard from Grumman Aircraft Corporation, we have elected to limit the Institute's future research focus to the subject of Human-Computer Interaction (HCI).

DESCRIPTORS: (U) *PERFORMANCE(HUMAN), *MAN COMPUTER INTERFACE, *HUMAN FACTORS ENGINEERING, AIRCRAFT, AWARDS, COMPUTERS, CORPORATIONS, INTERACTIONS, OPERATION, SCIENTISTS, TIME.

IDENTIFIERS: (U) PE61103F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A286 470 12/9 5/8

MASSACHUSETTS INST OF TECH CAMBRIDGE ARTIFICIAL INTELLIGENCE LAB

(U) Learning Maneuvers Using Neural Network Models.

DESCRIPTIVE NOTE: Final rept. 1 Apr 93-31 Mar 94,

AUG 94 128P

PERSONAL AUTHORS: Atkeson, Christopher

CONTRACT NO. F49620-93-1-0263

PROJECT NO. 2304

TASK NO. HS

MONITOR: AFOSR, XC
TR-94-0702, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The researchers explored issued involved in implementing robot learning for a challenging dynamic task, using a case study from robot juggling. They used a memory based local modeling approach (locally weighted regression) to represent a learned model of the task to be performed. Statistical tests are given to examine the uncertainty of a model, to optimize its prediction quality, and to deal-with noisy and corrupted data. They developed an exploration algorithm that explicitly deals with prediction accuracy requirements during exploration. Using all these ingredients in combination with methods from optimal control, the robot achieves fast real-time learning of the task within 40 to 100 trials.

DESCRIPTORS: (U) *LEARNING, *ROBOTS, *NEURAL NETS, ACCURACY, ALGORITHMS, APPROACH, CASE STUDIES, CONTROL, DYNAMICS, PREDICTIONS, QUALITY, REAL TIME, REQUIREMENTS, STATISTICAL TESTS, TEST AND EVALUATION, TIME, UNCERTAINTY, ARTIFICIAL INTELLIGENCE, OPTIMIZATION, MATHEMATICAL MODELS.

IDENTIFIERS: (U) WUAFOSR2304HS, LWR(Locally Weighted Regression)

AD-A286 440 12/3 25/2 12/1

BROWN UNIV PROVIDENCE RI DIV OF APPLIED MATHEMATICS

(U) Diffusion Approximations in Communication and Stochastic Theory.

DESCRIPTIVE NOTE: Final rept. 1 Jun 93-31 May 94,

NOV 94 10P

PERSONAL AUTHORS: Dupuis, Paul

CONTRACT NO. F49620-93-1-0279

MONITOR: AFOSR, XC
TR-94-0742, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Presented at the workshop on Stochastic Systems and Their Applications; Newport, RI, 15-16 Apr 94.

ABSTRACT: (U) The workshop Stochastic Systems and Their Applications was held in Newport, RI on April 15 & 16, 1994. The main topics of the conference were asymptotic methods in stochastic systems theory, and related applications. The goal of the conference was to review recent advances in asymptotic methods and expose some important new application areas where those methods might be useful.

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, *DIGITAL COMMUNICATIONS, WORKSHOPS, QUEUEING THEORY, CONVERGENCE, ASYMPTOTIC NORMALITY, ALGORITHMS, COMMUNICATIONS NETWORKS, ABSTRACTS, APPLIED MATHEMATICS, DIFFERENTIAL EQUATIONS, SYSTEMS ANALYSIS, HAMILTONIAN FUNCTIONS.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A286 438 20/14 9/1

DELAWARE UNIV NEWARK DEPT OF MATHEMATICAL SCIENCES

(U) Inverse and Control Problems in Electromagnetics.

DESCRIPTIVE NOTE: Final rept. 1 Jul 91-30 Jun 94,

OCT 94 255P

PERSONAL AUTHORS: Kleinman, Ralph E.; Angell, Thomas S.

CONTRACT NO. AFOSR-91-0277

MONITOR: AFOSR, XC
TR-94-0743, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summaries work carried out in a number of specific areas of investigation in inverse scattering and optimal control problems in electromagnetics. The progress is briefly described and detailed result's are included in an appendix. The major accomplishments include: the application of multi-criteria optimization techniques to problems in antenna design; the development of inverse scattering algorithms which use scattered field data in the frequency domain to reconstruct the shape, location and constitutive parameters of a scattering object; establishing the well-posedness of electromagnetic scattering problems with resistive or conductive boundary conditions; and derivation of new boundary integral equations for electromagnetic scattering from local distributions of a plane screen. In addition some new results on low frequency scattering have been found which establish the exact nature of the asymptotic expansion in two dimensions. Antenna design, Multicriteria optimization, Inverse scattering, Low frequency scattering, Integral equations.

DESCRIPTORS: (U) *ANTENNAS, *ACOUSTIC WAVES, *RADIO WAVES, *ELECTROMAGNETIC SCATTERING, *ANTENNA RADIATION PATTERNS, *INVERSE SCATTERING, ALGORITHMS, ASYMPTOTIC SERIES, BOUNDARIES, WAVE PROPAGATION, HYDROMECHANICS, FREQUENCY DOMAIN, INTEGRAL EQUATIONS, MAXWELLS EQUATIONS, LOW FREQUENCY, TOMOGRAPHY, OPTIMIZATION, SCATTERING, SHAPE.

AD-A286 436 12/9 12/6

MARYLAND UNIV COLLEGE PARK LAB FOR PLASMA RESEARCH

(U) Connectionist Models for Intelligent Computation.

DESCRIPTIVE NOTE: Final rept. 1 May 91-30 May 94

JUL 94 9P

PERSONAL AUTHORS: Chen, H. H.; Lee, Y. C.

CONTRACT NO. AFOSR-91-0257

MONITOR: AFOSR, XC
TR-94-0747, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This final report covers the work done by our group of neural network computing at the University of Maryland for the past three years. We studied the neural network's capability of processing temporal or sequential data. Recurrent neural networks were used to perform inference cn grammars. An external memory stack was constructed to work with the neural network to perform inferences on context free languages. And finally, a spatially homogeneous locally connected recurrent neural network that could simulate any given turing machine, including the universal Turing machine was devised. It is capable of performing universal computations and demonstrated the universal power of recurrent neural network architectures. To train these sequential neural net machine, we have investigated the forward propagating learning algorithms.

DESCRIPTORS: (U) *COMPUTATIONS, *NEURAL NETS, ALGORITHMS, EXTERNAL, GRAMMARS, LANGUAGE, LEARNING, MACHINES, MARYLAND, POWER, UNIVERSITIES, COMPUTER NETWORKS, COMPUTER ARCHITECTURE, SIGNAL PROCESSING.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A286 433 6/6 24/4 8/8

RHODE ISLAND UNIV NARRAGANSETT GRADUATE SCHOOL OF OCEANOGRAPHY

(U) Role of Resuspended Sediments in the Transport and Bioaccumulation of Toxic Organic Contaminants in the Nearshore Marine Environment.

DESCRIPTIVE NOTE: Final rept. 1 Jun 91-31 May 94,

OCT 94 283P

PERSONAL AUTHORS: Latimer, J. S.

MONITOR: AFOSR, XC
TR-94-0704, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A particle entrainment simulator was used to simulate conditions during resuspension events in order to investigate how resuspension affects the chemical behavior of hydrophobic organic contaminants such as PCBs and PAHs in the coastal marine environment. Organic contaminants were evaluated in bulk sediments, sized fractionated sediments and resuspended particulate material. The sediments evaluated represented distinctions in contaminant loadings and sediment textural characteristics. It was concluded that contaminants are injected into the overlying water column in direct response to the severity of the resuspension events. In general, on a volume normalized basis (i.e., mass < L(1) of water) the contaminants showed elevated levels as the applied shear increased from 2 to 5 dynes/ sq cm; however, on a mass normalized and organic carbon normalized basis, the chemical loadings decreased with increasing applied shear. Differences in the general behavior were traced to the textural and chemical differences of the bulk sediments used for resuspension experiments. It was concluded that the exact behavior of the contaminants was likely related to the amount of and contaminant load on material entrained during resuspension events and represents the interplay of: (1) dilution from depleted coarse grained material, (2) fortification from more highly loaded coarse grained materials as in the case of PAHs with log K sub ow >6 and (3) the effects from fine grained highly enriched material.

AD-A286 433 CONTINUED

DESCRIPTORS: (U) *CONTAMINANTS, *ACCUMULATION, *SUSPENDED SEDIMENTS, BEHAVIOR, CARBON, CHEMICALS, DILUTION, ENTRAINMENT, ENVIRONMENTS, FINES, FORTIFICATIONS, MASS, MATERIALS, PARTICLES, PARTICULATES, RESPONSE, SEDIMENTS, SIMULATORS, VOLUME, WATER, BIOLOGY, WATER POLLUTION, TOXICITY, HYDROCARBONS, ENVIRONMENTAL TESTS, CHEMICALS, CONCENTRATION(CHEMISTRY), FLUX(RATE).

IDENTIFIERS: (U) PE61103D, WUAFOSR3484RS, *Bioaccumulation, Organic materials

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A286 428 24/7

RHODE ISLAND UNIV NARRAGANSETT GRADUATE SCHOOL OF OCEANOGRAPHY

(U) Role of Resuspended Sediments in the Transport and Bioaccumulation of Toxic Organic Contaminants in the Nearshore Marine Environment.

DESCRIPTIVE NOTE: Annual technical rept. 1 Jun 92-31 May 93,

OCT 94 4P

PERSONAL AUTHORS: Latimer, James S.; Quinn, James G.

CONTRACT NO. AFOSR-91-0304

PROJECT NO. 3484

TASK NO. RS

MONITOR: AFOSR, XA
TR-94-0705, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Experiments designed to evaluate the transport and fate of organic contaminants have been completed. The extensive data generated during the laboratory studies will require additional time to evaluate and the result of this evaluation will be provided in the final report which will be completed by October 10, 1994 Resuspension, Organic contaminants, PES, PCBs, PAHs Pollution, Contaminated sediment.

DESCRIPTORS: (U) *CONTAMINANTS, *POLLUTION, *AROMATIC HYDROCARBONS, *ESTIMATES, *OIL POLLUTION, LABORATORIES, SEDIMENTS, TIME, TRANSPORT, ENERGY, ENTRAINMENT, GRAIN SIZE, HOMOGENEITY, TEST AND EVALUATION, PATTERNS.

IDENTIFIERS: (U) PE61103D, WUAFOSR3484RS.

AD-A286 428

AD-A286 084 6/5 6/1

CALIFORNIA UNIV BERKELEY DEPT OF MOLECULAR BIOLOGY

(U) Computer Based Analysis and Synthesis of Retinal Function.

DESCRIPTIVE NOTE: Annual rept. 1 Feb 92-31 Jan 93,

JAN 94 16P

PERSONAL AUTHORS: Werblin, Frank S.

CONTRACT NO. AFOSR-91-0196

PROJECT NO. 2313

TASK NO. AS

MONITOR: AFOSR, XC
TR-94-0676, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A fully functional, real time dynamic model of retinal activity has been implemented on a high speed digital image processor. The model uses a complete set of physiciological parameters derived from electrophysiological studies of synaptic transmission, cell coupling, voltage-gated currents and visual function in the retina of the tiger salamander. This model displays the patterns of activity generated at each sheet of retinal cells in real time, in response to any arbitrary stimulus pattern. Recent work measures both the patterns of activity and the activity of single units within the living retina itself at the level of the photoreceptors, horizontal and bipolar cells. These measurements are then correlated with the patterns generated by the model to verify the accuracy of the parameters and functions used to model the retina. For the most part, the correlations are quite close, suggesting that the parameters we have used and the functional relations between elements we have selected are adequate. A recording system using an array of electrodes to constructed and will be used during the next year to record patterns of activity. These patterns will then be compared with those generated by the model.

DESCRIPTORS: (U) *RETINA, *VERTEBRATES, *SYNTHESIS(CHEMISTRY), ACCURACY, AMPHIBIANS, ARRAYS,

AD-A286 084

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A286 084 CONTINUED

CELLS, CORRELATION, COUPLINGS, DYNAMICS, ELECTRODES, FUNCTIONS, MEASUREMENT, MODELS, PARAMETERS, PATTERNS, PHOTORECEPTORS, REAL TIME, RECORDING SYSTEMS, RECORDS, RESPONSE, SHEETS, TIME, VELOCITY, VOLTAGE, WORK, IMAGE PROCESSING, LAYERS, NERVE CELLS, NEURAL NETS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313AS.

AD-A286 066 6/5 9/3

TEXAS UNIV HEALTH SCIENCE CENTER AT SAN ANTONIO

(U) Investigation of Laser-Induced Retinal Damage: Wavelength and Pulsewidth Dependent Mechanisms.

DESCRIPTIVE NOTE: Final technical rept. 1 Apr 92-30 Jun 94,

JUN 94 19P

PERSONAL AUTHORS: Glickman, Randolph D.

REPORT NO. UTHSCSA-OPH-94-01

CONTRACT NO. AFOSR-91-0208

MONITOR: AFOSR, XC
TR-94-0621, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Although the consequences of excessive light exposure to the eye have been known since ancient times, the actual mechanisms of light damage in biological tissue have only been systematically investigated in this century. The response of tissue to laser or incoherent light depends on the power density, peak power, and wavelength of irradiating energy. At least three light damage mechanisms have been identified. Photochemical damage is produced by short wavelength light (typically < 550 nm) of long exposure duration, low peak power, and relatively low to moderate power density. Because tissue heating is minimal under these conditions, damage is thought to occur as result of excitation of target molecules to excited triplet states, some of which damage tissues directly through proton or electron transfers. The light-activated molecules may also cause damage indirectly by reacting with molecular oxygen to produce oxygen radicals, which are known agents of cellular damage. Thermal damage may be produced by light exposures of any wavelength capable of being absorbed by the tissue, given a sufficiently high power density and/or moderate to high peak power. Heating occurs by direct absorption of photons by a tissue chromophore which converts this photic energy into increased vibrational modes. The target chromophore, as well as surrounding structures depending on local heat conductivity, may then undergo thermal denaturation. At very high peak power,

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A286 066 CONTINUED

however, the strength of E-, or electrical, field of the absorbed electromagnetic wave may exceed the dielectric properties of the absorbing tissue, causing optical breakdown, ionization, plasma formation, and other phenomena associated with nonlinear (photodisruptive) damage mechanisms.

DESCRIPTORS: (U) *LASER DAMAGE, *ASCORBIC ACID, *EYE, *RETINA, OXIDATION REDUCTION REACTIONS, CELLS(BIOLOGY), EXPOSURE(PHYSIOLOGY), FREE RADICALS, ENZYMES, PULSED LASERS, NERVE CELLS, TISSUES(BIOLOGY).

IDENTIFIERS: (U) *Retinal damage, Wavelength, Pulsewidth

AD-A285 999 7/4 20/10 20/5 7/3

FLORIDA UNIV GAINESVILLE

(U) C2H4B2N2: Ab Initio Prediction of Structure and Properties of Ring and Chain Compounds.

94 8P

PERSONAL AUTHORS: Cernusak, Ivan; Urban, Miroslav; Stanton, John F.; Bartlett, Rodney J.

CONTRACT NO. F49620-92-J-0141

PROJECT NO. 2303

TASK NO. FS

MONITOR: AFOSR, XC
TR-94-0663, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Physical Chemistry, v98 n35 p8653-8659 1994. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) We present the MBPT(2) and coupled cluster description of the structure, energetics, and vibrational spectra for three isomers of 1,4-diaza-2,5-diboracyclohexadiene. The isomer ring and the acyclic Z- and E-isomers of C2H4B2N2 (with hydrogens attached to the central CB bond in 'cis' or trans positions) as well as the transition state between the ring and acyclic Z-isomer have been examined. All three molecules exhibit remarkable thermodynamic stability with respect to two cyanoborane monomers (HCN-BH) and borazirene (HCNBH) and also with respect to the common H2BCN molecule. We demonstrate a necessity for using the coupled cluster approach when reliable energy data are to be obtained. MBPT(2) is not accurate enough. The cyclic isomer is the most stable species. The barrier for the ring formation is acceptably low, suggesting that the synthesis of this novel molecule is possible via it

DESCRIPTORS: (U) *RINGS, *MOLECULAR STRUCTURE, *PREDICTIONS, *MOLECULAR PROPERTIES, *CYANOGEN, *BORANES, BARRIERS, ENERGY, ISOMERS, MOLECULES, MONOMERS, SPECTRA, STABILITY, STRUCTURES, SYNTHESIS, THERMODYNAMICS, TRANSITIONS, VIBRATIONAL SPECTRA, REPRINTS, ELECTRONS,

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 999 CONTINUED

QUANTUM THEORY, CHEMICAL BONDS, SOLID SOLUTIONS, CHEMICAL VAPOR DEPOSITION, PERTURBATION THEORY, N BODY PROBLEM, HYDROCARBONS, BORON, NITROGEN.

IDENTIFIERS: (U) WUAFOSR2303FS, PE61102F, *Cyanoboranes, AB Initio, *Chains, MBPT(Many-Body Perturbation Theory), Many-body, Diazadiboracyclohexadiene, Borazines, Coupled cluster

AD-A285 998 7/4 11/6 1/3 7/2

ELTRON RESEARCH INC BOULDER CO

(U) Electrochemical Impedance Pattern Recognition for Detection of Hidden Chemical Corrosion on Aircraft Components.

DESCRIPTIVE NOTE: Annual rept. 15 Aug-14 Oct 94,

OCT 94 4P

PERSONAL AUTHORS: Sammells, Anthony F.; Bowers, James S.

CONTRACT NO. F49620-94-C-0043

PROJECT NO. 3005

TASK NO. SS

MONITOR: AFOSR, XC
TR-94-0673, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Progress is presented for the program goal of developing diagnostic instrumentation for both detecting the presence and degree of hidden chemical corrosion on aircraft titanium and aluminum alloy components.

DESCRIPTORS: (U) *ALUMINUM ALLOYS, *CHEMICALS, *CORROSION, *TITANIUM, *ELECTROCHEMISTRY, *IMPEDANCE, *PATTERN RECOGNITION, *DETECTION, *AIRCRAFT EQUIPMENT, INSTRUMENTATION, ACIDS, METALS, PHASE SHIFT.

IDENTIFIERS: (U) PE65502F, WUAFOSR3005SS, SBIR.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 997 6/4

RUTGERS - THE STATE UNIV NEW BRUNSWICK NJ DEPT OF PSYCHOLOGY

(U) AASERT-92: Interdisciplinary Training in Visual Sciences.

DESCRIPTIVE NOTE: Annual rept. 1 Jul 93-30 Jun 94,

JUN 94 7P

PERSONAL AUTHORS: Kowler, Eileen

CONTRACT NO. F49620-93-1-0408

PROJECT NO. 3484

TASK NO. YS

MONITOR: AFOSR, XC
TR-94-0671, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The goal of the AASERT training is to combine work in oculomotor control and visual modeling. The research concentrates on the question of how saccades are able to be programmed accurately to target objects in natural scenes. There are two steps to this process, namely, selection of the goal object and spatial pooling of information in the selected object. the selection state is studied by means of dual-task experiments., using techniques developed in mathematical psychology to measure performance trade-offs of concurrent tasks. The pooling stage is being studied by means of experiments in which saccades are used to look at targets of varying size, contrast, and spatial frequency content. The goal is to discover the processing steps used by the visual system to compute a central landing position.

DESCRIPTORS: (U) *TRAINING, *VISUAL PERCEPTION, *VISUAL TARGETS, COMMERCE, CONTRAST, CONTROL, FREQUENCY, LANDING, PROCESSING, VISION, PSYCHOLOGY, SELECTION, TARGETS, WORK, MOTION.

IDENTIFIERS: (U) WUAFOSR3484YS, PE61103D, Visual science, Interdisciplinary training.

AD-A285 997

AD-A285 975 20/5 20/12 20/7 20/2

CORNELL UNIV ITHACA NY

(U) Ion Scattering and Deposition: The Role of Energetic Particles in Thin Film Growth.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 93-31 Aug 94,

AUG 94 3P

PERSONAL AUTHORS: Cooper, Barbara H.

CONTRACT NO. F49620-93-1-0504

PROJECT NO. 3484

TASK NO. XS

MONITOR: AFOSR, XC
TR-94-0675, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Energetic ions or neutrals (in the hyperthermal energy range) have been used in a number of thin film growth applications (e.g., sputtering and plasma deposition techniques, direct ion beam and ion-assisted deposition, etc.). These involve both direct deposition of the film species with an ion beam, and deposition by some other method during simultaneous ion bombardment. Experiments and simulations have shown that energetic ions can lower the substrate temperature required to achieve crystallinity, can change growth morphologies, and influence structure and crystallographic orientation in the film. In many cases, the mechanisms responsible for ion-induced modification of growth are not understood at the atomic level. We have initiated both scattering and scanning tunneling microscopy (STM) studies to probe these mechanism's.

DESCRIPTORS: (U) *DEPOSITION, *IONS, *SCATTERING, *REACTIVITIES, *CHARGE TRANSFER, ENERGY, FILMS, ION BEAMS, ION BOMBARDMENT, MICROSCOPY, MODIFICATION, PROBES, SCANNING, SIMULATION, SPUTTERING, STRUCTURES, SUBSTRATES, TEMPERATURE, THIN FILMS, TUNNELING, REPRINTS, ENERGETIC PROPERTIES, GROWTH(GENERAL), CRYSTALLIZATION, ATOMIC PROPERTIES.

IDENTIFIERS: (U) PE61103D, WUAFOSR3484XS.

AD-A285 975

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 974 20/5 7/3 7/4 9/3

WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

(U) Energy Transfer in Highly Vibrationally Excited Acetylene: Relaxation for Vibrational Energies from 6500 to 13 000 cm-1.

DESCRIPTIVE NOTE: Annual rept. 1 Nov 91-31 Oct 92,

JUL 92 9P

PERSONAL AUTHORS: Utz, A. L.; Tobiason, J. D.; Carrasquillo, E.; Fritz, M. D.; Crim, F. F.

CONTRACT NO. F49620-92-J-0040

PROJECT NO. 2303

TASK NO. ES

MONITOR: AFOSR, XC
TR-94-0668, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v97 n1 p389-396, 1 Jul 92. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Vibrational overtone excitation of acetylene molecules to energies between 6500 and 13000/cm followed by interrogation of the excited states during collisional relaxation determines both the mechanism and rates of energy transfer. A pulsed visible or near-infrared laser excites a single rotational state of C, H, in the region of the first (2V sub CH), second (3V sub CH) , or third (4V sub CH) overtone of the C-H stretching vibration, and an ultraviolet laser probes the excited molecules by laser-induced fluorescence after a variable delay. The self-relaxation rate constant of about 9 X 10(exp -10) cu cm/molecules/s is almost twice the Lennard-Jones collision rate constant and is nearly invariant with vibrational level. The energy-transfer rate constants from these population transfer measurements agree with those extracted from pressure-broadening data in both their size and insensitivity to vibrational state. Relaxation by the rare-gas atoms He, Ar, and Xe is nearly half as efficient as self-relaxation, suggesting that the internal structure of the collision partner is not

AD-A285 974

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particularly important in determining the relaxation rate. The invariance with vibrational level and the efficiency of rare-gas quenching indicate that rotational energy transfer is the most important relaxation pathway.

DESCRIPTORS: (U) *ACETYLENES, *COLLISIONS, *ENERGY TRANSFER, *EXCITATION, *MOLECULES, *RELAXATION, *VIBRATION, ATOMS, CONSTANTS, DELAY, EFFICIENCY, FLUORESCENCE, INFRARED LASERS, INTERNAL, INTERROGATION, INVARIANCE, LASER INDUCED FLUORESCENCE, LASERS, MEASUREMENT, POPULATION, PRESSURE, PROBES, QUENCHING, RATES, REGIONS, STRUCTURES, ULTRAVIOLET LASERS, VARIABLES, ROTATION, ELECTRONIC STATES, CARBON, HYDROGEN, HYDROCARBONS, HELIUM, ARGON, XENON, CHEMICAL REACTIONS, ATMOSPHERIC CHEMISTRY, COMBUSTION, CHEMICAL LASERS, REPRINTS, PULSED LASERS, VISIBLE SPECTRA.

IDENTIFIERS: (U) Overtones, Lennard-Jones, Broadening, Near infrared

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 962 11/6.2 9/1 7/6 20/13 AD-A285 962 CONTINUED

TORANAGA TECHNOLOGIES INC CARLSBAD CA Liquid Phase Sintering)

(U) Polymer Based Materials for Additive Processing of High Temperature Electronics Packaging.

DESCRIPTIVE NOTE: Annual progress rept. no. 1, 1-30 Sep 94,

OCT 94 3P

PERSONAL AUTHORS: Todd, Michael

CONTRACT NO. F49620-94-C-0074

PROJECT NO. STTR

TASK NO. TS

MONITOR: AFOSR, XC
TR-94-0672, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Work under Task 1 has begun on the evaluation of candidate high temperature transient liquid phase sintering (TLPS) systems as well as candidate high temperature polymer materials. In evaluating candidate metal and alloy systems, binary and available ternary phase diagrams are being reviewed to identify alloy systems that could be used in a high temperature application. The goal is to find a combination of metals and alloys that will go through TLPS at a temperature compatible with the polymer processing and that will form products that will be able to withstand the proposed high operating temperatures. DSC studies of some of these combinations have been done to confirm their potential. Metal powders studied so far include copper and various low melting point metals and alloys to ascertain the products formed by TLPS.

DESCRIPTORS: (U) *HIGH TEMPERATURE, *MATERIALS, *POLYMERS, *ADDITIVES, *ELECTRONICS, *PACKAGING, ALLOYS, COPPER, LIQUID PHASES, MELTING POINT, METALS, PHASE DIAGRAMS, POWDER METALS, PROCESSING, SINTERING, TEMPERATURE, TRANSIENTS, TEST AND EVALUATION, COMPOSITE MATERIALS, PACKAGED CIRCUITS.

IDENTIFIERS: (U) PE65502F, WUAFOSRSTTRTS, TLPS(Transient

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 930 11/6 1/3 7/2 7/4

LYNNTECH INC COLLEGE STATION TX

(U) Corrosion of Aircraft Materials: Correlation Between Nanometer Scale and Macroscopic Structural Damage Parameters.

DESCRIPTIVE NOTE: Annual rept.,

AUG 94 8P

PERSONAL AUTHORS: Gonzales-Martin, A.; Hodko, D.; Andrews, C.; Murphy, O. J.

CONTRACT NO. F49620-94-C-0040

PROJECT NO. 3005

TASK NO. SS

MONITOR: AFOSR, XC
TR-94-0674, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The following work has been carried out during the reporting period: (1) imaging of pitting corrosion initiation in aluminum at the nanometer scale, (2) study of the effects of main atmospheric pollutants on the initiation of the corrosion process; (3) identification of surface regions at an aluminum sample where corrosion is most likely to occur; (4) measurements of the electrochemical impedance spectra on Al sample before and during the pitting process in NaCl; (5) identification of the impedance parameters characteristic for the pitting the corrosion of the aluminum sample.

DESCRIPTORS: (U) *ALUMINUM, *CORROSION, *AIRCRAFT, *MATERIALS, ATMOSPHERICS, IDENTIFICATION, IMPEDANCE, MEASUREMENT, PARAMETERS, PITTING, POLLUTANTS, REGIONS, SCALE, SPECTRA, SURFACES, IMAGE PROCESSING, ELECTROCHEMISTRY, SODIUM CHLORIDE, MICROSCOPY, STRUCTURES, DAMAGE.

IDENTIFIERS: (U) PE65502F, WUAFOSR3005S, Nanometers, Atomic force microscopy

AD-A285 930

AD-A285 896 6/1 6/5 7/3

MISSOURI UNIV-COLUMBIA DEPT OF CIVIL ENGINEERING

(U) Augmentation Award for Monoclonal Antibody Detection of Chlorinated Benzenes on Contaminated Sediments.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 93-31 Aug 94,

SEP 94 3P

PERSONAL AUTHORS: Mossman, Deborah J.

CONTRACT NO. F49620-92-1-0523

MONITOR: AFOSR, XC
TR-94-0667, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The nonextractive immunoassay techniques developed with enzyme immunoassay procedures are being applied to fluorescent immunoassay visualization. Sorbed contaminants can be viewed using this modified fluorescent immunoassay techniques and and epifluorescent microscope to observe the microdistribution of sorbed contaminants. Fluorescent immunoassay, Sorption

DESCRIPTORS: (U) *CONTAMINANTS, *MONOCLONAL ANTIBODIES, *SEDIMENTS, *CHLOROBENZENE, ENZYMES, IMMUNOASSAY, MICROSCOPES, SORPTION, CHLORINATION, BENZENE, HALOGENATION, HYDROCARBONS, EXTRACTION, TEST AND EVALUATION, SULFONATES, SOILS, POLLUTANTS.

AD-A285 896

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 882 5/8

NEW YORK UNIV NY DEPT OF PSYCHOLOGY

(U) Facilitation and Interference in Identification of Pictures and Words.

DESCRIPTIVE NOTE: Final rept. 1 Dec 91-31 May 94,

OCT 94 54P

PERSONAL AUTHORS: Snodgrass, Joan G.

CONTRACT NO. F49620-92-J-0119

PROJECT NO. 2313

TASK NO. BS

MONITOR: AFOSR, XC
TR-94-0670, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This research is concerned with long-term facilitation and short-term interference and facilitation in identification of pictures and words. The long-term facilitation occurs when subjects are exposed to some representation of the item during a study episode, and then show improved identification of that item during a retention test. This type of facilitation is known as priming (or long-term priming) and the retention test is known as an implicit or indirect test because subjects are not instructed to think back to the prior study episode during the test. Much of our recent research has concerned the relationship between performance on the implicit test of picture fragment completion and the explicit test of recognition memory. Our major interest has been on the importance of maintaining the same surface features between study and test on performance in both implicit and explicit tests. Contrary to previous findings that explicit tests are impervious to surface changes and only sensitive to changes in meaning, we have found performance decrements from changes in surface features in explicit as well as implicit tests. These surface changes have been as subtle as differences in the level of fragmentation between study and test and as extreme as differences in the form of item (picture vs. word) between study and test. The research carried out under the grant has exploited this similarity between

AD-A285 882

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explicit and implicit tests within a components-of-information model of memory which accommodates both associations and dissociations between the two classes of tests.

DESCRIPTORS: (U) *MEMORY(PSYCHOLOGY), *RECOGNITION, *PERCEPTION(PSYCHOLOGY), IDENTIFICATION, PICTURES, WORDS(LANGUAGE).

IDENTIFIERS: (U) WUAFOSR2313BS, PE61102F.

AD-A285 882

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 874 20/5 7/3 20/6

WISCONSIN UNIV-MADISON

(U) Spectroscopy and Dynamics of Vibrationally Excited Molecules.

DESCRIPTIVE NOTE: Annual technical rept. May 92-Apr 93,

OCT 94 2P

PERSONAL AUTHORS: Crim, F. F.

CONTRACT NO. F49620-92-J-0073

PROJECT NO. 2303

TASK NO. ES

MONITOR: AFOSR, XC
TR-94-0666, AFOSR

UNCLASSIFIED REPORT

DESCRIPTORS: (U) *MOLECULES, *EXCITATION, *VIBRATION, *SPECTROSCOPY, DYNAMICS, COLLISIONS, ENERGY TRANSFER, OPTICS, OSCILLATORS, RELAXATION, ACETYLENE, FORMALDEHYDE, TRANSIENTS, GRATINGS(SPECTRA).

IDENTIFIERS: (U) PE61102F, WUAFOSR2303ES, Overtones

AD-A285 872 7/6 20/6

FOSTER-MILLER INC WALTHAM MA

(U) Novel E-O Polymers: NLO Materials with Superior Temporal Stability.

DESCRIPTIVE NOTE: Final technical rept. Jul 93-Jul 94,

SEP 94 24P

PERSONAL AUTHORS: Druy, M.

REPORT NO. NAS-3988-FM-94101-839, AFB-0053-FM-9740-841

CONTRACT NO. F49620-93-C-0053

MONITOR: AFOSR, XC
TR-94-0626, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report contains experimental results on a comprehensive study of the second order nonlinear optical (NLO) properties of a molecularly doped polymer system. A second-order NLO chromophore, 4-morpholino-4'nitrostilbene (MNS) was synthesized which possesses a large molecular first hyperpolarizability and dipole moment. The chromophore was doped into a polymer matrix with a high glass transition temperature and subsequently poled by a strong electric field to induce noncentrosymmetry required for second-order nonlinear optical behavior. An in situ poling technique was employed to determine the processing and poling parameters in order to obtain high and stable nonlinearities. Detailed information on the synthesis, processing, characterization, and results on a series of samples is presented. Materials, Second order nonlinear optical materials, Nonlinear optics

DESCRIPTORS: (U) *NONLINEAR OPTICS, *OPTICAL MATERIALS, *POLYMERS, CHROMOPHORES, DIPOLE MOMENTS, DIPOLES, ELECTRIC FIELDS, GLASS, OPTICS, SYNTHESIS, TEMPERATURE, TRANSITION TEMPERATURE, DOPING, STABILITY.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 801 7/3 12/3 20/5

OKLAHOMA STATE UNIV STILLWATER DEPT OF CHEMISTRY

(U) Statistical Effects in the Skeletal Inversion of Bicyclo(2.1.0) Pentane.

SEP 94 14P

PERSONAL AUTHORS: Raff, Lionel M.; Thompson, Donald L.; Sorescu, Dan C.

PROJECT NO. 2303

TASK NO. FS

MONITOR: AFOSR, XC
TR-94-0665, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in J. Phys. Chem. v101 n5 p3729-3741, 1 Sep 94. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) A semiempirical potential-energy surface for bicyclo(2.1.0) pentane which includes bond bending, and torsional terms is reported. The bond dissociation energies have been estimated using the available thermochemical data and results of ab initio molecular orbital calculations performed at the fourth order Moller-Plesset (MP4) perturbation theory level using a 6-31G** basis set. The the barrier for the ring inversion, and the fundamental frequencies of bicyclo(2.1.0) pentane and of the 1.3-cyclopentanediyl radical, the barrier for the ring inversion and the fundamental frequencies of bicyclo(2.1.0) penetane are in fair-to-good agreement with the measured and abinitio calculated values. Using a projection method of the instantaneous Cartesian velocities onto the normal mode vectors and classical trajectory calculations, the skeletal inversion and the intramolecular energy flow in bicyclo(2.1.0) pentane are studied for different types of excitation. For random energization on of the vi modes, the results of trajectory calculations agree with the predictions of statistical unimolecular theory. The same statis behavior is supported by the results of power spectra calculated at different energization levels. The significant broadening and overlapping of the spectral bands, together with the disappearance of characteristic

AD-A285 801 CONTINUED

spectral features in the power spectra of the flap angle, indicate high intramolecular vibrational redistribution rates and global statistical behavior. The total intramolecular vibrational relaxation rates for the energy flow from the flap mode have been extracted from the time dependence of the average total normal-mode energy in this mode. Statistical dynamics, Unimolecular reactions, Energy transfer.

DESCRIPTORS: (U) *ENERGY TRANSFER, *INVERSION, *TRAJECTORIES, AGREEMENTS, ANGLES, BARRIERS, BEHAVIOR, BENDING, DISSOCIATION, DYNAMICS, EXCITATION, FLOW, FREQUENCY, GLOBAL, MOLECULAR ORBITALS, PENTANES, PERTURBATION THEORY, PERTURBATIONS, POTENTIAL ENERGY, POWER SPECTRA, PREDICTIONS, RATES, RELAXATION, RINGS, SPECTRA, SURFACES, TIME DEPENDENCE, VALUE, VELOCITY, MOLECULAR PROPERTIES, TEST AND EVALUATION, REPRINTS.

IDENTIFIERS: (U) WUAFOSR2303FS, PE61102F, IVR(Intromolecular Vibrational Relaxation), *Skeletal inversion, Bicyclo(2-1-0) Pentenes, *Bicyclopentenes, *Intramolecular

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 771 20/5 7/3 20/6

WISCONSIN UNIV-MADISON

(U) Energy Transfer Dynamics in Isolated and in Colliding Highly Vibrationally Excited Molecules.

DESCRIPTIVE NOTE: Annual rept. no. 2 Nov 92-Oct 93,

MAY 94 14P

PERSONAL AUTHORS: Crim, F. F.

CONTRACT NO. F49620-92-J-0040

MONITOR: AFOSR, XC
TR-94-0669, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Our program explores the nature of highly vibrationally excited molecules and discovers the details of their intramolecular dynamics, both for colliding and isolated molecules. We use the combination of laser preparation of a rovibrational eigenstate and laser induced fluorescence probing of the vibrationally excited molecule to identify and characterize the initially excited vibrational state determine the state to state relaxation pathways and rates of the vibrationally excited molecules, and characterize of the excited electronic state in the probe step. We prepare an initial state by exciting a vibrational overtone transition with a pulsed laser and interrogate the highly vibrationally excited molecule, either immediately after excitation or after a time delay, with a second ultraviolet laser. The excitation transition reaches a high vibrational level in the ground electronic state, and the probe transition is to an electronically excited state from which we observe fluorescence.

DESCRIPTORS: (U) *MOLECULES, *VIBRATION, *EXCITATION, *COLLISIONS, *ENERGY TRANSFER, *ACETYLENE, *ROTATION, *ISOLATION, MOLECULAR PROPERTIES, LASER INDUCED FLUORESCENCE, DYNAMICS, PROBES, RATES, ELECTRONIC STATES, RELAXATION, PULSED LASERS, COUPLINGS, TRANSITIONS, GROUND STATE, ORGANIC COMPOUNDS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303ES, C2H2, Intramolecular, Overtones, Eigenstates

AD-A285 771

AD-A285 764 7/4 7/3 7/2

OKLAHOMA STATE UNIV STILLWATER DEPT OF CHEMISTRY

(U) Theoretical Studies of Elementary Chemisorption Reactions on an activated Diamond (111) Terrace,

94 7P

PERSONAL AUTHORS: Raff, Lionel M.; Perry, Martin D.

CONTRACT NO. F49620-92-J-0011

PROJECT NO. 2303

TASK NO. FS

MONITOR: AFOSR, XC
TR-94-0664, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in J. Phys. Chem. v98 p8128-8133 1994. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Rate coefficients, event probabilities, and dissociation probabilities for chemisorption reactions Of C2H2, C2H, CH3, CH2, C2H4, C2H3, C3H, and C sub n (n = 1-3) on an activated diamond (1 1 1) terrace structure and for H on sp3 carbon are computed using classical trajectory methods on the empirical hydrocarbon no. 1 potential developed by Brenner. The rate coefficients for nonradical species are between a factor of 2 to an order of magnitude smaller than the values obtained for radicals. The ethylene coefficient on a terrace is sufficiently large to permit C2H4 to Compete with C2H2 as a growth species. However, the C2H4 dissociation probability is 7 times that for C2H2. Acetylene is found to chemisorb more readily on a terrace than on a ledge structure. All of the radical species investigated have chemisorption rate coefficients in the range 10(exp 11)-10(exp 12)cu cm/mol s. The least reactive species is CH3. Atomic carbon has the largest chemisorption rate coefficient of all of the species investigated. This has also been found to be the case for chemisorption on a ledge structure. Consequently, atomic carbon should be a major growth species in plasma-CVD experiments where its concentration is expected to be large. Hydrogen atom addition to Sp3 carbon is found to be very fast. Chemisorption rates on a terrace are found

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 764 CONTINUED

to be slower than on a ledge structure for all hydrocarbon species except C3H. These results are consistent with previously reported thermodynamic Monte Carlo simulations reported by Xing and Scott and with recent experimental observations made by Li et al. and by Komanduri and coworkers.

DESCRIPTORS: (U) *CHEMISORPTION, *CHEMICAL REACTIONS, *DIAMONDS, ACETYLENES, ATOMS, CARBON, REPRINTS, COEFFICIENTS, CORRELATION, DISSOCIATION, ETHYLENE, ACTIVATION, HYDROCARBONS, HYDROGEN, PROBABILITY, PLASMA DEVICES, CHEMICAL VAPOR DEPOSITION, RATES, SIMULATION, STRUCTURES, THERMODYNAMICS, TRAJECTORIES, MONTE CARLO METHOD.

IDENTIFIERS: (U) WUAFOSR2303FS, PE61102F, Terraces, Ledge, Events

AD-A285 668 12/5 6/4

OREGON STATE UNIV NEWPORT HATFIELD MARINE SCIENCE CENTER

(U) Parallel Processing and Learning: Variability and Chaos in Self-Organization of Activity in Groups of Neurons.

DESCRIPTIVE NOTE: Annual rept. 1 Feb 93-31 Jan 94,

MAY 94 2P

PERSONAL AUTHORS: Mpitsos, George J.

CONTRACT NO. F49620-92-J-0140

PROJECT NO. 2312

TASK NO. A1

MONITOR: AFOSR, XC
TR-94-0425, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) I. Progress on the behavioral and the molecular biological goals: (1) We have finished, as originally proposed, the software and first actual physical system for computer-controlled training procedures with which to shape animal behavior and to perform learning-conditioning experiments. (2) We have constructed molecular biological vectors for generating muscarinic cholinergic receptor proteins pertaining specifically to all of the five known muscarinic receptors--this work follows on previous AFOSR-funded work relating to cholinergic enhancement of associative learning 14,15,11-13. II. Progress into the implications of attractors, perturbation analysis of neurons, and the use of language theory: (3) We have developed the conceptual rationale and conducted computer experiments to show that attractor gradients provide an integrative principle that globally acts on all synapses in a network of cooperative neurons. The consequences of this are extensive, and much naturally falls out naturally, e.g: synaptic strengths are optimally set with one another; the size of the Attractors, Dissipative action, learning, Muscarinic receptors, Symbolic dynamics, Finite-state automata, Neural networks, Neuron membrane perturbation analysis.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 668 CONTINUED

DESCRIPTORS: (U) *LEARNING, *NERVE CELLS, *COMPUTER AIDED INSTRUCTION, *PARALLEL PROCESSING, ANIMALS, AUGMENTATION, AUTOMATA, BEHAVIOR, COMPUTERS, DYNAMICS, GRADIENTS, MEMBRANES, MUSCARINE, NEURAL NETS, PERTURBATIONS, PROTEINS, SHAPE, SYNAPSE, TRAINING, CHAOS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A1

AD-A285 649 7/4 7/2 20/11

CALIFORNIA UNIV LOS ANGELES DEPT OF MATERIALS SCIENCE AND ENGINEERING

(U) Gradient Index Lenses from Sol-Gel Layering.

DESCRIPTIVE NOTE: Annual rept. 1 Jul 93-30 Jun 94,

JUN 94 7P

PERSONAL AUTHORS: Mackenzie, John D.

CONTRACT NO. F49620-93-1-0364

PROJECT NO. 3484

TASK NO. XS

MONITOR: AFOSR, XC
TR-94-0657, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

ABSTRACT: (U) The research proposed here is based on the principle of the density gradient column. A liquid (A) of low density is continuously mixed into a liquid (B) of higher density while B is allowed to flow slowly down the wall of a glass cylinder. The feed rate of A is equal to the flow rate of mixture. Thus, a gradient density column is formed. Such columns have been used to measure the density of semiconductors to five (5) significant figures. The gradient is stable for many months at room temperature. We proposed to use this method to prepare gradient index (GRIN) lenses from gels with large axial gradients. The chemical compositions of two sols are selected based on considerations of solubility between the sols; differences in refractive index, density, expansion coefficient and densification temperatures between resulting oxides.

DESCRIPTORS: (U) *GRADIENTS, *INDEXES, *LENSES, CHEMICAL COMPOSITION, COEFFICIENTS, EXPANSION, FLOW RATE, GELS, GLASS, LIQUIDS, LOW DENSITY, MIXTURES, OXIDES, RATES, REFRACTIVE INDEX, ROOM TEMPERATURE, SEMICONDUCTORS, SOLUBILITY, TEMPERATURE, WALLS, LAYERS, HIGH DENSITY, PHYSICAL PROPERTIES, TITANIUM DIOXIDE, SILICON DIOXIDE.

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AD-A285 649 CONTINUED

IDENTIFIERS: (U) PE61103D, WUAFOSR3484XS, *Sol-gel Process, *Layering, Column, Cylinder, GRIN(Gradient Index)

AD-A285 641 6/5

MISSOURI UNIV-COLUMBIA DEPT OF CIVIL ENGINEERING

(U) Monoclonal Antibody Detection of Chlorinated Benzenes on Contaminated Sediments.

DESCRIPTIVE NOTE: Final technical rept. 1 May 91-31 Jul 94,

SEP 94 39P

PERSONAL AUTHORS: Mossman, Deborah J.; Feldbush, Thomas L.

CONTRACT NO. AFOSR-91-0236

PROJECT NO. 3484

TASK NO. RS

MONITOR: AFOSR, XC
TR-94-0654, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A modification to allow direct testing of soils and sediments has been made to the standard immunoassay procedure. The modified procedure eliminates the need for extraction prior to ELISA testing. The new method has been successfully tested using 2,4-dinitrobenzene sulfonate as the model pollutant and crushed brick and sand as model soil matrices. The modified ELISA is very sensitive and easily distinguishes between contamination levels. Monoclonal antibodies were produced from antigens created from 4-chloroaniline, 2,4-dichloroaniline, and 3,4-dichloroaniline. One cell line of the anti-4-chloroaniline antibodies reacts to 4-chloroaniline, 2,4,5-trichloraniline, and 2,4,5-trichlorophenol. Immunoassay, Sediment testing, ELISA

DESCRIPTORS: (U) *CONTAMINATION, *IMMUNOASSAY, *MONOCLONAL ANTIBODIES, ANTIBODIES, ANTIGENS, BRICK, CELLS, EXTRACTION, MODELS, MODIFICATION, POLLUTANTS, SAND, SEDIMENTS, SOILS, STANDARDS, SULFONATES, CHLORINATED HYDROCARBONS, BENZENE, TEST AND EVALUATION, MATRICES(MATHEMATICS), PROTEINS, CROSSLINKING(CHEMISTRY), CULTURES(BIOLOGY).

IDENTIFIERS: (U) PE61103D, WUAFOSR3484RS, ELISA(Enzyme Linked Immunosorbant Assay), CB(Chlorinated Benzene)

AD-A285 641

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 640 20/1 6/4 12/9

BOSTON UNIV MA CENTER FOR ADAPTIVE SYSTEMS

(U) A Self-Organizing Neural Network Architecture for Auditory and Speech Perception with Applications to Acoustic and Other Temporal Prediction Problems.

DESCRIPTIVE NOTE: Annual technical rept. 1 May 93-30 Apr 94,

SEP 94 25P

PERSONAL AUTHORS: Cohen, Michael; Grossberg, Stephen

CONTRACT NO. F49620-92-J-0225

PROJECT NO. 2313

TASK NO. AS

MONITOR: AFOSR, XC
TR-94-0647, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This project is developing autonomous neural network models for the real-time perception and production of acoustic and speech signals. Our SPINET pitch model was developed to take realtime acoustic input and to simulate the key pitch data. SPINET was embedded into a model for auditory scene analysis, or how the auditory system separates sound sources in environments with multiple sources. The model groups frequency components based on pitch and spatial location cues and resonantly binds them within different streams. The model simulates psychophysical grouping data, such as how an ascending, tone groups with a descending tone even if noise exists at the intersection point, and how a tone before and after a noise burst is perceived to continue through the noise. These resonant streams input to working memories, wherein phonetic percepts adapt to global speech rate. Computer simulations quantitatively generate the experimentally observed category boundary shifts for voiced stop pairs that have the same or different place of articulation, including why the interval to hear a double (geminate) stop is twice as long as that to hear two different stops. This model also uses resonant feedback, here between list categories and working memory.

AD-A285 640 CONTINUED

DESCRIPTORS: (U) *ACOUSTIC SIGNALS, BOUNDARIES, FEEDBACK, FREQUENCY, GLOBAL, INPUT, NEURAL NETS, PHONETICS, REAL TIME, RUPTURE, SOUND PITCH, SPEECH RECOGNITION, AUDITORY PERCEPTION, HEARING, HARMONIC ANALYSIS, SIGNAL TO NOISE RATIO, COMPUTERS, SIMULATION, PATTERN RECOGNITION, DATA PROCESSING, AUDITORY SIGNALS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313AS, SPINET Computer program

AD-A285 640

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 639 6/4 6/5

STANFORD UNIV CA

(U) Cellular Interactions in the Suprachiasmatic Nucleus.

DESCRIPTIVE NOTE: Annual rept. 1 May 93-30 Apr 94,

MAY 94 12P

PERSONAL AUTHORS: VAN DEN Pol, Anthony N.

CONTRACT NO. F49620-93-1-0283

PROJECT NO. 2312

TASK NO. CS

MONITOR: AFOSR, XC
TR-94-0641, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The technical report examines the progress made in the last year relating to our work on the suprachiasmatic nucleus, the circadian clock in the mammalian hypothalamus. Much of the work examines different aspects of glutamate neurotransmission. Glutamate is probably the transmitter of the retinohypothalamic pathway, and therefore plays an important role in entrainment of circadian rhythms.

DESCRIPTORS: (U) *CIRCADIAN RHYTHMS, *HYPOTHALAMUS, *BIOLOGICAL RHYTHMS, CLOCKS, ENTRAINMENT, RIBONUCLEIC ACIDS, TRANSMITTERS, WORK.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312CS, *Suprachiasmatic nucleus, Retinohypothalamic, Circadian clock

AD-A285 639

AD-A285 638 7/3 7/4 20/5 20/10

WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

(U) The Direct Observation, Assignment, and Partial Deperturbation of the Nu 4 and Nu 6 Vibrational Fundamentals in A 1Au Acetylene (C2H2),

FEB 93 13P

PERSONAL AUTHORS: Utz, A. L.; Tobiason, J. D.; Carrasquillo, E.; Sanders, L. J.; Crim, F. F.

CONTRACT NO. F49620-92-J-0040

PROJECT NO. 2303

TASK NO. ES

MONITOR: AFOSR, XC
TR-94-0661, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v98 n4 p2742-2753, 15 Feb 93. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) A pulsed-laser double resonance technique provides previously unavailable spectroscopic data on the rovibrational structure of tilde (1)A sub u acetylene (C2H2). Our assignment and analysis of transitions to the A tilde state v'4 (torsion) and v'6 (antisymmetric in-plane bend) vibrational fundamentals uncovers a strong Coriolis interaction between these two nearly degenerate modes and weaker Coriolis interactions between the v'4/v'6 pair and remote A state rovibrational levels. We deperturb the direct Coriolis interaction between v'4 and v'6 to obtain vibrational frequencies, Coriolis coupling constants and partially deperturbed rotational and centrifugal distortion constants for these previously unobserved fundamentals. Parity selection rules for the tilde (reverse) X band permit an unambiguous assignment of the vibrations (v'4 = 764 +/- 0.1/cm and v'6 = 768.3 +/- 0.2/cm). We use these new experimental values to reassign several tilde state vibrations and to assign previously unidentified tilde state levels. We also identify two vibrational resonances that seem to be important in determining the rovibrational structure of tilde (1)A sub u C2H2.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 638 CONTINUED

DESCRIPTORS: (U) *ACETYLENES, *POLYATOMIC MOLECULES, *VIBRATION, ALLOCATIONS, CONSTANTS, COUPLINGS, DISTORTION, FREQUENCY, INTERACTIONS, LASERS, PARITY, PULSED LASERS, ELECTRONIC STATES, RESONANCE, SELECTION, STRUCTURES, TORSION, TRANSITIONS, CORIOLIS EFFECT, CENTRIFUGAL FORCE, ENERGY LEVELS, SPECTROSCOPY, PERTURBATIONS, SYMMETRY, QUANTUM THEORY, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303ES, *Deperturbation, Double resonance, Rovibrational, Antisymmetric, Degenerate, Undegrade, Trans-bending, Direct observation, Assignment, Ab initio.

AD-A285 638

AD-A285 636 6/4 20/1

STATE UNIV OF NEW YORK AT STONY BROOK DEPT OF PSYCHOLOGY

(U) Signal- and Listener- Based Factors in Complex Auditory Pattern Perception.

DESCRIPTIVE NOTE: Final technical rept. 15 Sep 91-14 Aug 94,

SEP 94 13P

PERSONAL AUTHORS: Samuel, Arthur G.

CONTRACT NO. AFOSR-91-0378

PROJECT NO. 2313

TASK NO. AS

MONITOR: AFOSR, XC
TR-94-0644, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The research project was designed to delineate principles that underlie the perception of complex auditory patterns. During the granting period, nine lines of research were conducted that investigated various aspects of complex auditory perception. These research efforts largely focussed on perception of speech sounds, and provided important information about three aspects of perception. Several of the projects clarified the role that the listener's knowledge of English words can play in decoding speech. Additional studies examined how lower-level representations (spectral patterns, high-frequency sublexical patterns) are processed. Across a number of the research efforts, attentional effects were investigated, to determine how they modulate other processing. Collectively, the research effort made significant progress in clarifying how human listeners decode very complex sounds.

DESCRIPTORS: (U) *AUDITORY PERCEPTION, *AUDITORY SIGNALS, DECODING, HIGH FREQUENCY, HUMANS, PATTERNS, PERCEPTION, SOUND, SPEECH, MUSIC, INFORMATION PROCESSING, COGNITION, SPEECH RECOGNITION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313AS.

AD-A285 636

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 635 20/5 12/4

COLORADO UNIV AT BOULDER

(U) New Methods for Large Scale Local and Global Optimization.

DESCRIPTIVE NOTE: Final rept. 1 Dec 91-30 Nov 93,

JUL 94 9P

PERSONAL AUTHORS: Byrd, Richard; Schnabel, Robert

REPORT NO. 153-7645

CONTRACT NO. AFOSR-90-0109

MONITOR: AFOSR, XC
TR-94-0487, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) We have pursued all three topics described in the proposal during this research period. A large amount of effort has gone into the development of large scale global optimization methods for molecular configuration problems. We have developed new general purpose methods that combine efficient stochastic global optimization techniques with several new, more deterministic techniques that account for most of the computational effort, and the success, of the methods. We have applied our methods to Lennard-Jones problems with up to 75 atoms, to water clusters with up to 31, molecules, and polymers with up to 58 amino acids. The results appear to be the best so far by general purpose optimization methods, and appear to be leading to some interesting chemistry issues. Our research on the second topic, tensor methods, has addressed several areas. We have designed and implemented tensor methods for large sparse systems of nonlinear equations and nonlinear least squares, and have obtained excellent test results on a wide range of problems. We have also developed new tensor methods for nonlinearly constrained optimization problem, and have obtained promising theoretical and preliminary computational results. Finally, on the third topic, limited memory methods for large scale optimization, we have developed and implemented new, extremely efficient limited memory methods for bound constrained problems, and new limited memory trust regions methods, both using our-recently developed compact representations for quasi-

AD-A285 635

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Newton matrices. Computational test results for both methods are promising. Global optimization, Molecular configurations, Parallel computation, Nonlinear equations, Constrained optimization.

DESCRIPTORS: (U) *MOLECULAR STRUCTURE, AMINO ACIDS, COMPUTATIONS, CONFIGURATIONS, GLOBAL, OPTIMIZATION, POLYMERS, REGIONS, TEST AND EVALUATION, WATER, ATOMIC ENERGY LEVELS, MATHEMATICAL MODELS, PARALLEL PROCESSING, ALGORITHMS, NONLINEAR ANALYSIS, PROBLEM SOLVING, HEURISTIC METHODS, MATHEMATICAL PROGRAMMING.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 634 11/2 11/4

LEHIGH UNIV BETHLEHEM PA DEPT OF MATERIALS SCIENCE AND ENGINEERING

(U) Microstructural Design for Tough Ceramics.

DESCRIPTIVE NOTE: Final rept.,

OCT 94 144P

PERSONAL AUTHORS: Chan, Helen M.; Lawn, Brian R.

CONTRACT NO. F49620-92-J-0039

MONITOR: AFOSR, XC
TR-94-0652, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Results of a program on the influence of microstructure on the toughness and fatigue properties of ceramics are presented. A theoretical analysis of toughness-curve behavior in two-phase ceramics has been completed. This analysis identifies particle size, volume fraction, and internal thermal expansion anisotropy stress as key microstructural variables in the toughness response. A simple contact fatigue methodology for investigating the accumulation of damage at stress concentrations in tough ceramics, using the Hertzian indentation test in cyclic loading, has been developed. This methodology offers several advantages over traditional long-crack fatigue testing, and relates directly to the stress states that occur in contact bearings. Optical and acoustic emission tests reveal fundamental departures from the classic cone fractures that form in homogeneous brittle materials. Instead, a new kind of damage, shear-initiated microfractures in a distributed zone directly beneath the contact area is observed. The damage thereby occurs in the short-crack region, and is most severe in those ceramics that show the highest long-crack toughness, underlying the need for compromise in materials design. The results bear strongly on such practical properties as bearing fatigue, and strength, wear and erosion of structural ceramics.

DESCRIPTORS: (U) *CERAMIC MATERIALS, *COMPOSITE MATERIALS, *TOUGHNESS, ACOUSTIC EMISSIONS, ANISOTROPY, BEHAVIOR, CRACKS, DAMAGE, EMISSION, EROSION, FATIGUE(MECHANICS), CYCLIC LOADS, MICROSTRUCTURE, FATIGUE TESTS(MECHANICS), DESIGN CRITERIA, OPTICAL PROPERTIES, ACOUSTIC PROPERTIES, BRITTLENESS, PARTICLE SIZE, RESPONSE, TEST AND EVALUATION, SHEAR STRESSES, THERMAL EXPANSION, WEAR, FRACTURE(MECHANICS), GRAIN SIZE, GLASS, STRENGTH(MECHANICS), DEFECTS(MATERIALS), TOLERANCES(MECHANICS).

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 633 20/5 20/13 20/3 20/11

GEORGIA INST OF TECH ATLANTA SCHOOL OF PHYSICS

(U) Ion-Molecular Spiraling Collisions and Termolecular Recombination.

DESCRIPTIVE NOTE: Interim rept. 1 Jul 89-30 Jun 94,

AUG 94 189P

PERSONAL AUTHORS: Qi, X.

REPORT NO. GIT-89-023

CONTRACT NO. AFOSR-89-0426

PROJECT NO. 2301

TASK NO. DS

MONITOR: AFOSR, XC
TR-94-0643, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A modification is made to the semiclassical adiabatic invariance method for ion-dipole and ion-quadrupole capture collisions. This modification to the adiabatic invariance method includes the effects of coupling of the rotational angular momentum of the target molecule with the orbital angular momentum of the projectile ion. The adiabatic potential energies, cross sections and rate coefficients for capture into rotational eigenstates /J, m > of the target molecule, as well as the thermal averaged rate coefficients are calculated for a number ion-dipole and ion-quadrupole systems for the temperature range 10 < or - T (deg K) < or - 1000.

DESCRIPTORS: (U) *ION MOLECULE INTERACTIONS, *COLLISIONS, *MOLECULAR PROPERTIES, *DIPOLES, *QUADRUPOLE MOMENT, *ANGULAR MOMENTUM, THESES, RECOMBINATION REACTIONS, RATES, ADIABATIC CONDITIONS, COUPLINGS, ROTATION, TARGETS, ORBITS, INVARIANCE, COEFFICIENTS, PROJECTILES, THERMAL PROPERTIES, POTENTIAL ENERGY, CROSS SECTIONS, ANISOTROPY, EXOTHERMIC REACTIONS, CHEMICAL REACTIONS, TRANSITIONS.

IDENTIFIERS: (U) PE61102D, WUAFOSR2301DS, *Spiraling, Eigenstates, *Termolecular recombination, Langevin theory,

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Semiclassical, ACCSA(Adiabatic Capture and Centrifugal Sudden Approximation), Capture

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 623 22/2

MARYLAND UNIV COLLEGE PARK SYSTEMS RESEARCH CENTER

(U) Control of Complex Multibody Spacecraft.

DESCRIPTIVE NOTE: Final rept. 15 Jan 90-14 Jan 94,

JUL 94 33P

PERSONAL AUTHORS: Krishnaprasad, P. S.

CONTRACT NO. AFOSR-90-0105

MONITOR: AFOSR, XC
TR-94-0488, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The Project C-MULTICS (Control of Complex Multibody Spacecraft) is a center of excellence at the University of Maryland. The work supported by this project is concerned with the modeling, analysis, control and simulation of large scale complex multibody spacecraft with rigid and flexible components.

DESCRIPTORS: (U) *SPACECRAFT, CONTROL, MARYLAND, SCALE, SIMULATION, UNIVERSITIES, WORK.

AD-A285 623

AD-A285 622 20/4 12/1

HIGH TECHNOLOGY CORP HAMPTON VA

(U) Computational Studies of Laminar to Turbulence Transition.

DESCRIPTIVE NOTE: Final rept. 15 Dec 90-14 May 94,

JUL 94 132P

PERSONAL AUTHORS: Malik, Mujeeb R.; Li, Fei

CONTRACT NO. F49620-91-C-0014

MONITOR: AFOSR, XC
TR-94-0488, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Nonlinear evolution of Goertler and crossflow vortices is investigated. The associated secondary instabilities of these streamwise vortices are also studied. The Goertler vortex is found to be subject to two types of secondary modes: a sinuous mode and a varicose mode similar to that observed in the experiments. The growth rate of the sinuous mode is higher initially but the varicose mode becomes more unstable in the downstream. It is also found that crossflow vortices are subject to a high frequency secondary instability prior to breakdown, as found in experiments performed on swept wings. In agreement with the experiments, our calculations show that the frequency of this secondary instability, which resides on top of the crossflow vortex, is an order of magnitude higher than the frequency of the most amplified traveling crossflow disturbances. The interaction of stationary and traveling disturbances is also considered. These studies have been carried out by using parabolized stability equations (PSE) and a two-dimensional (2D) eigenvalue approach. The mathematical nature of PSE approximation is also discussed. Goertler vortices, Crossflow vortices, Secondary instability, Parabolized stability equations, 2D Eigenvalue problem.

DESCRIPTORS: (U) *BOUNDARY LAYER TRANSITION, EIGENVALUES, HIGH FREQUENCY, INSTABILITY, STABILITY, STATIONARY, SWEPT WINGS, TWO DIMENSIONAL, VORTICES, COMPUTATIONAL FLUID DYNAMICS, CROSS FLOW, INVISCID FLOW, GAS SURFACE INTERACTIONS, APPROXIMATION(MATHEMATICS), NONLINEAR ANALYSIS, TWO DIMENSIONAL, PARTIAL DIFFERENTIAL EQUATIONS,

AD-A285 622

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 622 CONTINUED

TURBULENT FLOW, LAMINAR FLOW.

IDENTIFIERS: (U) WUAFOSR2307BS, PE61102F, *PSE(Parabolized Stability Equations)

AD-A285 618 6/10 6/5

WYOMING UNIV LARAMIE DEPT OF MOLECULAR BIOLOGY

(U) USAF Cellular Mechanism of Turnover of the Stressed Induced Protein HSP70.

DESCRIPTIVE NOTE: Final rept. 15 Apr 83-14 Apr 94,

APR 94 11P

PERSONAL AUTHORS: Petersen, Nancy S.

CONTRACT NO. F49620-92-J-0234

PROJECT NO. 2312

TASK NO. AS

MONITOR: AFOSR, XC
TR-94-0480, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Because heat shock proteins are made by all organisms in response to environmental stress, it has been proposed that accumulation of these proteins could be useful in environmental monitoring. In order to use the accumulation of heat shock proteins as indicators of environmental stress, it is important to understand how their stability is regulated. This research is concerned with determining the influences that regulate the stability of the major heat shock protein, hsp70, in rainbow trout (used for environmental monitoring) and in fruit files (a well characterized system used for basic research). During the tenure of this grant progress has been made characterizing the rainbow trout heat shock response, cloning and sequencing the rainbow trout heat shock gene, and in generating antibodies specific for fruit fly and rainbow trout hsp70. The accumulation of hsp70 in juvenile rainbow trout exposed to heavy metals has been assessed in collaboration with the H. Berman Lab. Commercially available antibodies have been used to identify hsp70 breakdown products in flies, trout, chick and mouse, and the sequences the major breakdown fragments of the fly hsp70 generated in vivo have been determined.

DESCRIPTORS: (U) *ACCUMULATION, *PROTEINS, *HEAT STRESS(PHYSIOLOGY), ANTIBODIES, FRAGMENTS, FRUITS, GENES,

AD-A285 618 CONTINUED

GRANTS, HEAT, INDICATORS, METALS, MONITORING, ATMOSPHERIC REFRACTION, RESPONSE, SEQUENCES, SHOCK, STABILITY, TROUT, IN VIVO ANALYSIS, ENVIRONMENTS, SYNTHESIS(CHEMISTRY), IN VITRO ANALYSIS.

IDENTIFIERS: (U) HSP(Heat Shock Proteins), WUAFOSR2312AS, PE61102F

AD-A285 617 20/6

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

(U) Design, Synthesis and Characterization of Novel Nonlinear Optical Materials.

DESCRIPTIVE NOTE: Annual rept. 1 Apr 83-31 Mar 94,

MAR 94 13P

PERSONAL AUTHORS: Prasad, Paras N.

CONTRACT NO. F49620-93-C-0017

PROJECT NO. 2303

TASK NO. CS

MONITOR: AFOSR, XC
TR-94-0649, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This project consisted of four tasks each dealing with a different class of nonlinear optical materials. Task (U): Second-Order material. During the past year we used theoretical and experimental studies to develop a new class of materials in which a commonly used electron donor chromophore was replaced by a thiophene ring. To efficiently pole a second-order ionic chromophore, the use of a bulky counter-ion in order to reduce ionic conductivity was demonstrated. We also investigated the imagineary part of X(2) by electro-absorption. Task (II): Third-Order Materials. We synthesized a group of phosphoylides which contain a polarizable P atom. Their X(3) behavior were experimentally investigated using femtosecond Kerr gate. Using our new method of optically heterodyned and phase-tuned Kerr gate method, we investigated both the signs and the magnitudes of the real and the imaginary components of X(3). We showed that in the case of one-photon saturation, the sign of imaginary part is negative, while for two-photon absorption, this sign is positive. A very efficient two-photon induced fluorescence was also found for another nonlinear chromophore, diethylaminonitrostyrene, in the crystalline form. Task (III): Photorefractive polymeric composites.

DESCRIPTORS: (U) *OPTICAL MATERIALS, *NONLINEAR OPTICS,

AD-A285 617 CONTINUED

ABSORPTION, ATOMS, BEHAVIOR, CHROMOPHORES, CONDUCTIVITY, COUNTERS, ELECTRON DONORS, ELECTRONS, FLUORESCENCE, IONS, MATERIALS, PHOTONS, RINGS, SATURATION, THIOPHENES, TWO PHOTON ABSORPTION, POLYMERS, COMPOSITE MATERIALS, ELECTRIC FIELDS.

IDENTIFIERS: (U) WUAFOSR2303CS, PE61102F, Photorefractive materials, Sol-gels

AD-A285 610 9/3 20/6

MASSACHUSETTS INST OF TECH CAMBRIDGE RESEARCH LAB OF ELECTRONICS

(U) Mechanisms and Diagnostics of Ultrashort Pulse Laser Ocular Effects.

DESCRIPTIVE NOTE: Annual technical rept. 15 Apr 93-14 Apr 94,

SEP 94 12P

PERSONAL AUTHORS: Fujimoto, James G.

CONTRACT NO. F49620-93-1-0301

PROJECT NO. 2312

TASK NO. AS

MONITOR: AFOSR, XC
TR-94-0656, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of our program is to investigate the mechanisms of ultrashort pulse laser retinal injury and to develop and apply new diagnostics for the assessment of retinal injury. During the past contract period, we have focussed on the development of a new diagnostic technique called optical coherence tomography (OCT) for the noninvasive measurement of ocular and retinal structure.

DESCRIPTORS: (U) *PULSED LASERS, *DIAGNOSTIC EQUIPMENT, OPTICAL PROPERTIES, HIGH TEMPERATURE, LASER INDUCED FLUORESCENCE, IN VIVO ANALYSIS, OPTICAL DETECTION, INFRARED LASERS, WOUNDS AND INJURIES.

IDENTIFIERS: (U) OCT(Optical Coherence Tomography), WUAFOSR2312AS, PE61102F

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 609 20/3 7/2 20/11 11/3

TRUSTEES OF COLUMBIA UNIV NEW YORK

(U) Study of Improved Critical Currents and Mechanical Properties in the Y-Ba-Cu-O Superconductor with Silver or Y2BaCuO3 or 211 Dispersions.

DESCRIPTIVE NOTE: Final rept. 1 Apr 92-31 Aug 94,

AUG 94 93P

PERSONAL AUTHORS: Chan, Siu-Wai

CONTRACT NO. F49620-92-J-0160

MONITOR: AFOSR, XC
TR-94-0651, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The microstructure of the top-seeded, single grain, melted textured YBCO materials with different vol% 211 were investigated. The homogeneity of 211 distribution was greatly improved by using a solution precipitated 211 powder in preparation. Crack spacings and twin spacings were found to decrease with increasing vol% of the 211 particles. The 211 particles were found to be effective in holding crack propagation. Relationship between twin spacing and interparticle spacing was found to depend on the elastic strain energy from the tetragonal to orthorhombic transformation. The accumulative beneficial effects of the 211 addition on Jc are summarized. The highest Jc was 10(exp 4) A/sq cm at 77K 1T. Our transmission electron microscopy of the Au/YBCO interfaces shows well-bonded interfaces with no extraneous phases present with the (001) lattice fringe of YBCO terminated at the interfaces abruptly. Both integral steps of (001) height and multiples of 1/3(001) steps were observed. Our finding supports earlier contact resistivity and XPS results of the Au/YBCO interfaces. Amorphous carbon films were shown to protect superconducting YBCO films from degradation by humidity. The YBCO films with carbon coating were founded to retain critical current densities 4 orders of magnitude higher than the uncoated YBCO films after 2h at 100% relative humidity stressing at room temperature.

DESCRIPTORS: (U) *MECHANICAL PROPERTIES, *YTTRIUM, *BARIUM, *COPPER OXIDES, *SUPERCONDUCTORS, CARBON,

AD-A285 609

AD-A285 609 CONTINUED

COATINGS, CRACK PROPAGATION, DEGRADATION, DENSITY, DISTRIBUTION, ELECTRON MICROSCOPY, ENERGY, FILMS, HEIGHT, HOMOGENEITY, HUMIDITY, INTEGRALS, INTERFACES, MATERIALS, MICROSTRUCTURE, PARTICLES, PHASE, POWDERS, PREPARATION, ROOM TEMPERATURE, TRANSFORMATIONS, OXIDES, SILVER, DISPERSIONS, PRECIPITATION, ELASTIC PROPERTIES, STRAIN(MECHANICS), THIN FILMS.

IDENTIFIERS: (U) *Critical currents, Spacings, Twin spacings, Interparticle, Flux-pinning, Passivation, YBaCuO, YBCo

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 608 7/2 7/4 9/1 20/5

CALIFORNIA UNIV LOS ANGELES DEPT OF CHEMISTRY AND BIOCHEMISTRY

(U) Influence of Single Atomic Height Steps on F2 Reactions with Si(100)-2x1,

AUG 94 6P

PERSONAL AUTHORS: Carter, Lawrence E.; Carter, Emily A.

CONTRACT NO. F49620-93-1-0145

MONITOR: AFOSR, XC
TR-94-0650, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Vacuum Science and Technology A, v12 n4 p2235-2239, Jul/Aug 94. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) We have investigated the effect of single atomic height steps on the reactivity of F2 molecules with a clean Si(100) 2 x 1 reconstructed surface via molecular dynamics simulations using an ab initio derived Stillinger-Weber-type potential. Of the three types of single atomic height steps thought to commonly exist on Si(100) surfaces, the presence of the lower energy S Sub A and S Sub B rebonded steps had a negligible effect on reactivity compared to the perfect (100) surface while the higher energy S Sub B' nonbonded step slightly increased the adsorption probability. These results suggest that current discrepancies between experimental observations and theoretical predictions of the partitioning between reaction channels for F2 reacting with the Si(100) surface are not due to the presence of steps on the silicon surface in the laboratory.

DESCRIPTORS: (U) *SILICON, *FLUORINE, ADSORPTION, CHANNELS, DYNAMICS, ENERGY, HEIGHT, MOLECULES, OBSERVATION, PREDICTIONS, PROBABILITY, REACTIVITIES, SIMULATION, SURFACES, REPRINTS, CHEMICAL REACTIONS, MOLECULAR PROPERTIES, SEMICONDUCTORS, ETCHING, ATOMS, ENERGY LEVELS.

IDENTIFIERS: (U) PE61102F, *Atomic height steps, Ab initio, Steps

AD-A285 608

AD-A285 607 6/11 7/2 8/8 6/3

WYOMING UNIV LARAMIE

(U) A New Approach to the Determination of Bioavailable Metals in Surface Waters.

DESCRIPTIVE NOTE: Final technical rept. 1 May 91-30 Apr 94,

SEP 94 49P

PERSONAL AUTHORS: Bergman, Harold L.; MacRae, Russell K.

CONTRACT NO. AFOSR-91-0258

PROJECT NO. 3484

TASK NO. RS

MONITOR: AFOSR, XC
TR-94-0655, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The goal of this research was to develop analytical methods capable of determining the concentration of toxic (bioavailable) forms of copper in natural surface waters. The approach should also be applicable to other metals. The approach was: (1) to determine the apparent binding affinity of the gills of fish and other aquatic biota for copper using novel competition bioassay and copper residue accumulation techniques; and (2) to modify the performance of commercial cation exchange resins or synthesize custom-made cation exchange resins, to match the copper binding affinity of fish and other aquatic biota. Using a range of procedures, the apparent copper binding affinities (log of the Apparent Binding Affinity (ABA)) were determined for rainbow trout gills (6.4-7.2), brook trout gills (7.1-7.2), trout mucus (6.97.7), and Daphnia magna (6.6-8.1). Based on these results an acceptable value for log ABA would be 7.6 for cation-exchange chromatography procedures to measure the bioavailable fraction of copper. Commercially available resins under a variety of conditions consistently had copper binding affinities that were 2 to 3 orders of magnitude higher than the measured values for aquatic biota. Custom cation exchange resins were synthesized and yielded binding affinities closer to that of aquatic biota, but additional work is

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needed to standardize and validate this approach. Bioavailability, Metals, Water quality, Copper, Aquatic biota, Toxicity, Fish.

DESCRIPTORS: (U) *COPPER, *FISHES, *METALS, *SURFACE WATERS, *TOXICITY, ACCUMULATION, ATMOSPHERIC REFRACTION, BIOASSAY, CATIONS, CHROMATOGRAPHY, COMPETITION, DAPHNIA, EXCHANGE, MUCUS, PLASTICS, RESIDUES, TROUT, WATER QUALITY, BIOLOGY, FISH GILLS, AQUATIC BIOLOGY.

IDENTIFIERS: (U) PE61103D, WUAFOSR3484RS, *Bioavailable, Binding affinity, Aquatic biota, Magna

AD-A285 606 21/8.2 21/2 20/1

COLORADO UNIV AT BOULDER DEPT OF MECHANICAL ENGINEERING

(U) Nonlinear Acoustic Processes in a Solid Rocket Engine.

DESCRIPTIVE NOTE: Final technical rept. 30 Sep 91-1 Jan 94,

MAR 94 154P

PERSONAL AUTHORS: Kassoy, David R.; Kirkkipn, Kadir; Zhao, Qing

CONTRACT NO. AFOSR-89-0023

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR, XC
TR-94-0653, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A new formulation for chamber flow dynamics in a model of solid rocket engine shows that vorticity generation and convection are prominent physical features of the flow field. Analytical and fully computational methods are employed. to describe a basically inviscid interaction between acoustic disturbances arising from specified boundary disturbances and a sidewall injected flow field which simulates propellant burning. The mathematical model, based on the Navier Stokes equations, is developed in terms of an initial value problem in order to describe the complete, natural chamber flow evolution arising from boundary driven disturbances. The approach is analogous to a direct numerical simulation, although contemporary perturbation methods are employed to extract specific spatial and temporal scales from the equations and boundary conditions. The results show that large unsteady vorticity is created at the injected surface (sidewall) and convects into the cylinder with the radial component of the injection flow velocity.

DESCRIPTORS: (U) *ACOUSTICS, *COMBUSTION, *SOLID PROPELLANT ROCKET ENGINES, BOUNDARIES, CHAMBERS, CONVECTION, FLOW FIELDS, FORMULATIONS, INJECTION, INTERACTIONS, MATHEMATICAL MODELS, PERTURBATIONS, ROCKET

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 606 CONTINUED

ENGINES, SIMULATION, VELOCITY, VORTICES, NAVIER STOKES EQUATIONS, UNSTEADY FLOW, NONLINEAR SYSTEMS, ACOUSTIC WAVES, BOUNDARY LAYER FLOW.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A1, Vorticity

AD-A285 605 6/4 1/4

WRIGHT STATE UNIV DAYTON OH DEPT OF PSYCHOLOGY

(U) Perception and Control of Locomotion.

DESCRIPTIVE NOTE: Annual technical rept. 1 Sep93-31 Aug 94,

SEP 94 12P

PERSONAL AUTHORS: Flach, John M.

REPORT NO. WSU/ATR/662480

CONTRACT NO. F49620-93-1-0560

PROJECT NO. 3484

TASK NO. YS

MONITOR: AFOSR, XC
TR-94-0648, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes an empirical study to evaluate the ability to track a constant altitude as a function of the structure in optical flow (Manipulated using types of ground texture - splay, depression, dot, and block and the rate of forward motion - global optical flow (GOF) rate). Subjects were asked to track a constant altitude (25 ft) in the face of disturbances to the vertical, lateral, and fore-aft axes. The critical independent variables were texture type and GOF rate. Texture type was manipulated within subjects and GOF rate was manipulated between subjects. Dependent variables included RMS altitude error and correlated control power. The results showed a crossover interaction. For both dependent measures, performance at 0 GOF rate was best with depression angle and poorest with splay angle. The reverse was true at a GOF rate of 3 eyeheights/s. The results are consistent with the hypothesis, suggested by Flach et al. (1992), that the ability to pick-up information about altitude from optic flow depends on the amount of optical flow activity specific to altitude (signal) relative to the flow activity arising from other factors (e.g., motion in the fore-aft and lateral axes) (noise). The optical flow that results from forward motion (GOF rate) is visible in the depression, dot and

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

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block textures. This 'noise' makes it more difficult to differentiate the optical activity specific to changes in altitude. With splay texture, there is no change in the flow as a result of forward motion. Therefore, performance with splay texture is independent of GOF rate

DESCRIPTORS: (U) *VISUAL PERCEPTION, *LOCOMOTION, *ALTITUDE CONTROLLERS, AVIATION ACCIDENTS, PILOTS, MOTION, DENSITY, DEPRESSION ANGLES, HUMAN FACTORS ENGINEERING.

IDENTIFIERS: (U) PE61103D, WUAFOSR3484YS, Optical flow

AD-A285 604 7/4 20/5 9/3 7/2

GEORGIA INST OF TECH ATLANTA SCHOOL OF PHYSICS

(U) Recombination, Ion-Molecule Collisions and (Laser Assisted) Electron-Excited Atom Collisions.

DESCRIPTIVE NOTE: Final rept. 1 Jul 89-30 Jun 94,

AUG 94 56P

PERSONAL AUTHORS: Flannery, M. R.

REPORT NO. GIT-89-024

CONTRACT NO. AFOSR-89-0426

PROJECT NO. 2301

TASK NO. DS

MONITOR: AFOSR, XC
TR-94-0642, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This final report documents all of the research performed on the project entitled Termolecular Association of Ions in Gases. Theoretical research was completed on (a) Termolecular Recombination, (b) laser-assisted electron-excited atom collisions, (c) atom-excited atom collisions, (d) ion-molecule collisions, and (e) electron-ion dissociative recombination. Recombination, Three-body dissociative, Ion-molecule, Laser assisted, Electron-excited atom collisions.

DESCRIPTORS: (U) *ATOMS, *COLLISIONS, *ELECTRONS, *LASERS, *EXCITATION, IONS, MOLECULES, ION MOLECULE INTERACTIONS, GASES.

IDENTIFIERS: (U) WUAFOSR2301DS, Termolecular association, Three body dissociative, *Recombination

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 602 20/5 7/3 20/10

WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

(U) Direct Measurements of Rotation-Specific, State-to-State Vibrational Energy Transfer in Highly Vibrationally Excited Acetylene,

JUL 94 9P

PERSONAL AUTHORS: Tobiason, J. D.; Utz, A. L.; Crim, F. F.

CONTRACT NO. F49620-92-J-0040

PROJECT NO. 2303

TASK NO. ES

MONITOR: AFOSR, XC
TR-94-0658, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v101 n2 p1108-1115, 15 Jul 94. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) Vibrational overtone excitation followed by laser-induced fluorescence detection allows the direct measurement of rotationally resolved vibrational energy transfer rates in highly vibrationally excited acetylene molecules. We detect transfer from the initial, even rotational states J Sub i = 0-2 of 3V(3) (tilde V-) = 9640/cm) to the nearly isoenergetic final state J f = 4 of V (1) + V (2) + V (3) + 2 V (4) 1=0 (Tilde V sub zero = 9668/cm). For these pathways, we observe changes in energy of u to Absolute value of delta E = 530/cm (approx 2.5 kT) and in angular momentum quantum number of up to the absolute value of delta J = 18 in a single collision and we measure state-to-state rate constants of about 0.1 /microseconds (160 collisions). Measurements under single collision conditions ensure that the vibrational relaxation is free of any rotational equilibration. By applying detailed balance and summing the resulting reverse rate constants, we obtain a total rate constant of 1.3 /mirosecond (13 collisions) for transfer from V (1) + V (2) + V (3) + 2V(4), 1 = 0), J Sub f to all final rotational state in 3V(3).

DESCRIPTORS: (U) *ACETYLENE, *ENERGY TRANSFER,

AD-A285 602

AD-A285 602 CONTINUED

*VIBRATION, *ELECTRONIC STATES, *ROTATION, *MEASUREMENT, *EXCITATION, *POLYATOMIC MOLECULES, REPRINTS, DETECTION, LASER INDUCED FLUORESCENCE, ANGULAR MOMENTUM, QUANTUM THEORY, COLLISIONS, RATES, CONSTANTS, RELAXATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303ES, *State to state, Overtone, Isoenergetic, Pathways, Rovibrational states, Specific

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 601 20/5 7/3 20/10

WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

(U) The Direct Observation Assignment, and Partial Deperturbation of Nu 5 and Nu 3 + Nu 5 in A 1Au Acetylene (C2H2),

JUL 93 10P

PERSONAL AUTHORS: Tobiason, J. D.; Utz, A. L.; Crim, F. F.

CONTRACT NO. F49620-92-J-0040

PROJECT NO. 2303

TASK NO. ES

MONITOR: AFOSR, XC
TR-94-0660, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v99 n2 p928-936, 15 Jul 93. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) A pulsed-laser double resonance technique (vibrational overtone excitation combined with laser-induced fluorescence detection) provides previously unavailable spectroscopic data on the rovibrational structure of (tilde) A (1) A sub u acetylene (C2H2). We collected fluorescence excitation spectra of transitions to vibronic levels lying between 2800 and 4300/cm above tilde A state origin. In this region, we observe only two vibronic levels that are relatively unperturbed, which we assign to the tilde A state antisymmetric C-H stretching fundamental vibration V-(5) and its combination with the trans-bending vibration, V-(3)+ V-(5). Parity and symmetry selection rules for the tilde A (left arrow) tilde X band ab initio predictions for V-(5) fundamental frequency, and the known frequencies of other tile A state vibrations permit an unambiguous assigment of the vibrations. The fit of V-(5) and V-(3) + V-(5) to a near-prolate asymmetric top hamiltonian yields the observed vibrational frequencies (V-(5) = 2857.4 + or - 0.2/cm (-1) and V-(3) + V-(5) = 3894.4 + or - 0.1/cm) and rotational and centrifugal distortion constants.

DESCRIPTORS: (U) *POLYATOMIC MOLECULES, *ACETYLENE,

AD-A285 601

AD-A285 601 CONTINUED

PULSED LASERS, RESONANCE, VIBRATION, REPRINTS, EXCITATION, LASER INDUCED FLUORESCENCE, PERTURBATIONS, DETECTION, SPECTROSCOPY, ROTATION, SPECTRA, ELECTRONIC STATES, PERTURBATIONS, CARBON, HYDROGEN, SYMMETRY, SELECTION RULES(PHYSICS), FREQUENCY, ENERGY LEVELS, QUANTUM THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303ES, C2H2, Direct observation, Assignment, *Partial deperturbation, Double resonance, Overtone, Vibronic, Stretching, Antisymmetric, Ungerade, Gerade

AD-A285 601

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 600 20/5 7/3 20/10

WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

(U) Normal Modes Analysis of A-State Acetylene Based on Directly Observed Fundamental Vibrations,

OCT 93 7P

PERSONAL AUTHORS: Tobiason, J. D.; Utz, A. L.; Sibert, E. L., III; Crim, F. F.

CONTRACT NO. F49620-92-J-0040

PROJECT NO. 2303

TASK NO. ES

MONITOR: AFOSR, XC
TR-94-0652, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v99 n8 p5762-5763, 15 Nov 93. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) Recent experimental results permit a detailed normal modes analysis of A-state acetylene (C2H2) and its isotopomers (C2HD and C2D2). Using only experimentally determined frequencies and measured or estimated anharmonicities, we determine harmonic frequencies for the 11 directly observed and unambiguously assigned vibrational fundamentals. The normal modes calculation varies force constants to fit the 11 harmonic frequencies and yields a complete set of harmonic frequencies, force constants, and Coriolis coefficients for the three isotopomers. A complete set of fundamental frequencies calculated from the set of harmonic frequencies allows a comparison to and, in some cases, suggests a reassessment of frequencies for tentatively assigned fundamental vibrations.

DESCRIPTORS: (U) *ACETYLENES, *VIBRATION, COEFFICIENTS, COMPARISON, CONSTANTS, FREQUENCY, HARMONICS, YIELD, POLYATOMIC MOLECULES, CORIOLIS EFFECT, ORGANIC COMPOUNDS, QUANTUM THEORY, REPRINTS, ELECTRONIC STATES, EXCITATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303ES, Normal modes, Direct observation, Gerade, Trans-bending, C2H2, Ungerade,

AD-A285 600 CONTINUED

Overtone, Isotopomers, Force constants, Ab initio.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 599 7/3 20/5 20/10

WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

(U) State-to-State Rotational Energy Transfer in Highly Vibrationally Excited Acetylene,

NOV 92 12P

PERSONAL AUTHORS: Tobiason, J. D.; Utz, A. L.; Crim, F. F.

CONTRACT NO. F49620-92-J-0040

PROJECT NO. 2303

TASK NO. ES

MONITOR: AFOSR, XC
TR-94-0662, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v97 n10 p7437-7447, 15 Nov 92. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) Vibrational overtone excitation of single rovibrational eigenstates in acetylene, followed by state-resolved, laser-induced fluorescence (LIF) interrogation of the collisionally populated quantum states, permits a direct determination of both the pathways and rates of the state-to-state rotational energy transfer in a polyatomic molecule containing about 10,000/cm of internal energy. The data, which we acquire under single-collision conditions, demonstrate the importance of rotational energy transfer, even at high levels of vibrational excitation. The observed state-to-state rotational energy transfer pathways populate a wide range of angular momentum states and account for about 70% of the total relaxation rate. About one-third of the total relaxation occurs absolute value of delta E = 2 transitions, which are the smallest allowed, but there are also single-collision energy transfer pathways with absolute value of delta E as large as 20 and absolute value of delta E as large as 600/cm (approx 3kt). The state-resolved rate constants for rotational energy transfer decrease monotonically as the energy difference between the initial and final state increases. Empirical exponential energy gap and combined power-exponential gap fitting relations recover the energy dependence of the

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state-to-state rate constants, but a simple power gap law does not.

DESCRIPTORS: (U) *ACETYLENE, *EXCITATION, *VIBRATION, *ENERGY TRANSFER, *ROTATION, *ELECTRONIC STATES, *POLYATOMIC MOLECULES, REPRINTS, RESOLUTION, LASER INDUCED FLUORESCENCE, COLLISIONS, QUANTUM THEORY, RATES, INTERNAL, ANGULAR MOMENTUM, RELAXATION, CHEMICAL REACTIONS, CARBON, HYDROGEN, EXPONENTIAL FUNCTIONS, CORIOLIS EFFECT.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303ES, *State to State, Overtone, Eigenstates, Pathways, Anharomic couplings, Basis sets, Stretching

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 598 7/3 7/5 20/5

COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

(U) Conformational Control of the Photochemistry and Photophysics of Diphenylacetone,

94 8P

PERSONAL AUTHORS: Lipson, Matthew; Noh, TaeHee; Doubleday, Charles E.; Zaleski, Jeffrey M.; Turro, Nicholas J.

CONTRACT NO. AFOSR-91-0340

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XC
TR-94-0648, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Physical Chemistry, v98 n36, p8844-8850, 1994. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) We report the direct observation of the lowest triplet states of 1,3-diphenylacetone (DBK) and two methylated derivatives by direct detection time-resolved electron spin resonance (TRESR) at 15 K in methylcyclohexane glass. The spectral features are broad with multiple peaks in delta (2) = 2 region, which we assign to a multitude of conformations certain of these conformations can be photochemically removed, DBK and 1-p-tolyl-3-phenylacetone (p-MeDBK) give single-exponential fluorescence lifetimes of 2.7 ns. 1, 3-di-p-tolylalacetone (p.p' -diMeDBK) gives a multiexponential fluorescence decay.

DESCRIPTORS: (U) *ACETONES, *PHENYL RADICALS, *ORGANIC COMPOUNDS, *PHOTOCHEMICAL REACTIONS, *ELECTRON DENSITY, DETECTION, CONTROL, REPRINTS, PHYSICS, METHYL RADICALS, GLASS, SPIN STATES, RESONANCE, SPECTRA, SUBSTITUTION REACTIONS, FLUORESCENCE, EXPONENTIAL FUNCTIONS, DECAY, KETONES, RINGS, CYCLOHEXANES, CLEAVAGE, ELECTRONIC STATES, ELECTRON SPIN RESONANCE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, *Diphenylacetone, *Conformations, Triplet states,

AD-A285 598

AD-A285 598 CONTINUED

*Photophysics, Methylcyclohexane, DBK(diphenylacetone), *Unpaired electron density, Toyl, TRESR(Time Resolved Electron Spin Resonance)

AD-A285 541 20/4

ARIZONA UNIV TUCSON

(U) Real-Time Adaptive Control of Mixing in a Plane Shear Layer.

DESCRIPTIVE NOTE: Final technical rept. 15 Jul 89-14 Dec 93,

DEC 93 225P

PERSONAL AUTHORS: Glezer, Ari; Champagne, Frank H.

CONTRACT NO. AFOSR-89-0465

PROJECT NO. 2307

TASK NO. BS

MONITOR: AFOSR, XC
94-0628, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A control system for the enhancement and regulation of mixing in a nonreactive plane shear layer has been developed in a two-stream closed-return water facility. Mixing of a passive scalar is estimated using a thermal analog in which the two streams have uniform, steady temperatures differing by 3 C. Control is effected via an array of surface heaters flush-mounted on the flow partition and cross-stream temperature distributions are measured with a resolution of 0.03 C using an array of closely-spaced cold wire sensors. Open-loop forcing is used for the enhancement of mixing in a nonreactive plane shear layer. Mixing of a passive scalar is estimated using a thermal analog to species concentration. From the temperature distributions, a number of mixing performance measures can be calculated to describe the development of mixing with downstream distance. Further, phase-locked measurements are used to study the spatial and temporal structure of the flow and in particular the overall mixedness and composition of the flow as a function of phase in the forcing cycle. In closed-loop experiments, the position of the temperature interface between the two streams is measured in the plane of its cross stream Schlieren image by an optical sensor which is placed upstream of the rollup of the primary vortices. The output from the interface position sensor is fed back to the surface heaters. A transfer function has been developed to predict the effect of feedback on the interface motion. The dependence of various measures of mixing on the feedback gain k and the total delay time delta between the actuators and the sensors is studied.

DESCRIPTORS: (U) *STREAMFLOW ANALYSIS, *SHEAR FLOW, *VORTICES, *MIXING, ADAPTIVE CONTROL SYSTEMS, BOUNDARY LAYER FLOW, FEEDBACK, OPTICAL DETECTORS, SCHLIEREN PHOTOGRAPHY, REAL TIME, WATER FLOW.

IDENTIFIERS: (U) PE61102F, WUAFOSR2307BS.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 519 20/4 20/6

NEW MEXICO UNIV ALBUQUERQUE DEPT OF MECHANICAL ENGINEERING

(U) Dynamical System Prediction of the Scalar Field in a Turbulent Channel Flow.

DESCRIPTIVE NOTE: Final rept. 1 Nov 90-31 Jan 94,

MAR 94 18P

PERSONAL AUTHORS: Truman, C. R.; Zadoks, Rick I.

CONTRACT NO. AFOSR-91-0071

PROJECT NO. 2307

TASK NO. BS

MONITOR: AFOSR, XC
TR-94-0633, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The importance of large-scale (or coherent) structure to optical propagation through turbulent shear flow has been demonstrated. Direct simulations of low-Reynolds-number flows which include a passive scalar as well as experimental data have been examined. A passive scalar in the simulations is related to refractive-index fluctuations, while a heated jet was used in the experiment. Large fluctuations associated with large-scale turbulent structure produce a majority of the optical phase error. A low-order dynamical model for the near-wall region of a turbulent channel flow was developed. These predictions illustrate the importance of the dynamics of the turbulent shear flow to optical phase error. Techniques to use limited data to estimate the effect of large-scale structure upon optical propagation were developed. A round turbulent jet was also studied using a large eddy simulation as well as experimental data. Temperature at several locations and jitter in an optical beam propagated through the flow can be measured simultaneously in an experimental facility constructed at the Air Force Phillips Laboratory. A low-dimensional dynamical model for the round jet with passive scalar to be developed in subsequent work will be compared with this experimental data. Turbulence, Dynamical systems, Aero-optics.

AD-A285 519

AD-A285 519 CONTINUED

DESCRIPTORS: (U) *TURBULENT FLOW, CHANNEL FLOW, ERRORS, ESTIMATES, EXPERIMENTAL DATA, JITTER, PREDICTIONS, PROPAGATION, REFRACTIVE INDEX, REGIONS, REYNOLDS NUMBER, TEMPERATURE, OPTICAL ANALYSIS, COMPUTERIZED SIMULATION, FLOW FIELDS, OPTICAL DATA, PHASE DISTORTION, VORTICES, JET FLOW, FLOW VISUALIZATION.

IDENTIFIERS: (U) WUAFOSR2307BS, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 498 20/4 12/5

NORTH CAROLINA STATE UNIV AT RALEIGH DEPT OF MECHANICAL AND AEROSPACE ENGINEER ING

(U) Time Accurate Computation of Unsteady Inlet Flows with a Dynamic Flow Adaptive Mesh.

DESCRIPTIVE NOTE: Final rept. 15 Mar 92-30 Jun 94,

SEP 94 52P

PERSONAL AUTHORS: McRae, D. S.; Benson, Rusty A.

CONTRACT NO. F49620-92-J-0189

PROJECT NO. 2307

TASK NO. AS

MONITOR: AFOSR, XC
TR-94-0625, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Research has been performed to obtain very accurate dynamic simulations of supersonic inlet unstart using CFD codes and a dynamic solution adaptive mesh algorithm developed at NCSU. The codes use Runge-Kutta time differencing and Advective Upwind Split Method spatial differencing in finite volume form. Other changes have been incorporated to improve the time accuracy when the computational mesh is dynamically adapted. Solutions have been obtained and animated for unstart of generic 2-D mixed compressions and fully supersonic inlets. Analysis of results revealed that laminar viscous flow unstart occurs by a separation/oblique shock mechanism rather than movement of a normal shock. Turbulent flow simulations reveal that initial shock motion occurs initially but then reverts to the separation/oblique shock mechanisms. 3-D steady and unsteady simulations are presented and conclusions drawn concerning the role of separation in inlet unstart. Computational fluid dynamics, Dynamic adaptive mesh, Mixed compression inlet unstart, Unsteady flow.

DESCRIPTORS: (U) *COMPUTATIONAL FLUID DYNAMICS, *UNSTEADY FLOW, *COMPUTERIZED SIMULATION, ACCURACY, ALGORITHMS, COMPRESSION, MESH, MOTION, SEPARATION, SUPERSONIC INLETS, TURBULENT FLOW, VISCOUS FLOW, SHOCK

AD-A285 498

AD-A285 498 CONTINUED

WAVES, MACH NUMBER, HIGH RESOLUTION, FLOW SEPARATION, RUNGE KUTTA METHOD, FLOW VISUALIZATION, COMPUTER GRAPHICS.

IDENTIFIERS: (U) WUAFOSR2307AS, PE61102F, Adaptive mesh algorithms

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 497 11/2 11/4

LEHIGH UNIV BETHLEHEM PA MATERIALS RESEARCH CENTER

(U) Multiphase Ceramics for Mechanical and Structural Reliability at Low and Elevated Temperatures.

DESCRIPTIVE NOTE: Final rept. 15 Dec 90-30 Jun 94,

JUN 94 206P

PERSONAL AUTHORS: Harmer, M. P.; Chan, H. M.; Miller, G. A.; Thompson, A. M.; Zhao, J.

CONTRACT NO. AFOSR-91-0126

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR, XC
TR-94-0623, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) AFOSR project 91-0126 was undertaken to develop a design approach for improving the high-temperature structural reliability (e.g., resistance to creep, fracture and grain growth) and room temperature mechanical reliability (e.g., flaw tolerance) of structural ceramics. Some of the major accomplishments of this work are highlighted below: (1). Engineering of the grain boundary chemistry in alumina resulted in a lowering of the creep rate by over two orders of magnitude by the addition of 1000ppm of Y203. It is conjectured that the presence of a highly segregated oversized (similarly charged) ion at the grain boundaries is responsible for inhibiting grain boundary diffusion and lowering the creep rate. (2). Duplex microstructures of A1203:YAG and A1203:Zr02 exhibited lower creep rates and higher fracture toughness values than their single phase constituents. The creep data was well described by a composite creep equation developed for isostrain behavior (i.e. the strain rates are the same for each phase). The higher fracture toughness was attributed to the contribution of low energy interphase boundaries to the overall composite toughness.

DESCRIPTORS: (U) *FRACTURE(MECHANICS), *CERAMIC MATERIALS, *GRAIN GROWTH, *COMPOSITE MATERIALS,

AD-A285 497

AD-A285 497 CONTINUED

*TOUGHNESS, STRUCTURAL RESPONSE, MECHANICAL PROPERTIES, CREEP, DIFFUSION, GRAIN BOUNDARIES, HIGH TEMPERATURE, IONS, LOW ENERGY, DEFECTS(MATERIALS), RELIABILITY, ROOM TEMPERATURE, TOLERANCES(MECHANICS), STRAIN RATE, TEMPERATURE, MICROSTRUCTURE, ALUMINATES, POLYCRYSTALLINE, FORTRAN, ALUMINUM OXIDES, COMPUTER PROGRAMS, COMPUTER AIDED DESIGN.

IDENTIFIERS: (U) WUAFOSR2306A2, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 496 20/9 20/14 17/4.3

TENNESSEE UNIV KNOXVILLE PLASMA SCIENCE LAB

(U) Interaction of Electromagnetic Fields with Magnetized Plasmas.

DESCRIPTIVE NOTE: Final rept. 1 Apr 89-31 Mar 94,

MAR 94 328P

PERSONAL AUTHORS: Roth, J. R.

REPORT NO. UTK-PSL-94-3

CONTRACT NO. AFOSR-89-0319

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR, XC
TR-94-0594, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This Final Scientific Report describes research at the UTK Plasma Science Laboratory which was supported by the Air Force Office of Scientific Research, contract AFOSR 89-0319, with Dr. Robert J. Barker, Program Manager. Eight archival scientific papers were published, 19 oral or poster conference papers were presented at the annual APS and IEEE plasma meetings and one patent was obtained and two additional patents were filed for. This contract also supported three graduate theses, including partial support for one Ph.D. dissertation, and two Master of Science in Electrical Engineering theses. This contract additionally supported approximately eight person-years of half time GRA research and training, and the preparation of nine routine reports to the Air Force. This contract also supported Professor Shenggang Liu, UTK's first Visiting Distinguished Professor, for a period of one year. Physics, Plasma, Plasma turbulence, RF Plasma interactions, Plasma absorption, Radar absorption, RF Plasma absorption, RF Plasma emission, Plasma cloaking, One atmosphere plasma.

DESCRIPTORS: (U) *STEALTH TECHNOLOGY, *ELECTROMAGNETIC RADIATION, *PLASMAS(PHYSICS), *ELECTROMAGNETIC FIELDS,

AD-A285 496

AD-A285 496 CONTINUED

*RADAR ABSORBING MATERIALS, ABSORPTION, AIR FORCE, CONTRACTS, ELECTRICAL ENGINEERING, EMISSION, RADIOFREQUENCY, INTERACTIONS, PATENTS, ABSTRACTS, DRAG REDUCTION, DAMPING, RADAR, THESES, TURBULENCE, MICROWAVES, GLOW DISCHARGES, MAGNETOHYDRODYNAMICS, CYCLOTRON MAGNETS, REFLECTORS, AIRCRAFT, SPACECRAFT.

IDENTIFIERS: (U) WUAFOSR2301A7, PE61102F

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 466 20/5 20/8

GEORGIA INST OF TECH ATLANTA SCHOOL OF PHYSICS

(U) Angular-Momentum Transfer in Collisional Ionization.

DESCRIPTIVE NOTE: Interim rept. 1 Jul 89-30 Jun 94,

JUL 94 7P

PERSONAL AUTHORS: Flannery, M. R.; Haffad, A.

REPORT NO. GIT-89-019

CONTRACT NO. AFOSR-89-0426

MONITOR: AFOSR, XC
TR-94-0638, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Physical Review A, v50 n1 p429-434, Jul 94. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The double differential cross sections for ionization in electron + H(nl) collisions are reported as a function of the impact energy E of the projectile, final energy Ef, and angular momentum Lf of the ejected electron. This process is assumed to occur via an energy-changing and angular-momentum-changing binary collision between the Rydberg electron in a prepared state (nl) and the projectile electron or H(1s). The atomic projectile can also be excited during this process. Systematic trends in the variation of the classical ionization cross sections with final angular momentum Lf of the ejected electron are discussed and are in accord with a previous quantal treatment, whereby the nondipole transitions are much more important in the low- and intermediate-energy range of relative motion, and that the value of the final angular momentum of the ejected electron depends mainly on the initial value of the principal quantum number N of the rydberg atom. (Author)

DESCRIPTORS: (U) *IONIZATION, *MOMENTUM TRANSFER, *DIFFERENTIAL CROSS SECTIONS, MOLECULAR STATES, ANGULAR MOMENTUM, PARTICLE COLLISIONS, EXCITATION, ATOMIC ENERGY LEVELS, ELECTRON SCATTERING, ELECTRON FLUX, HYDROGEN, REPRINTS, ENERGY TRANSFER, QUANTUM THEORY, ION MOLECULE INTERACTIONS.

AD-A285 466

AD-A285 466 CONTINUED

IDENTIFIERS: (U) *Rydberg electron, Binary encounter approximation, DDCS(Doubly Differential Cross Sections).

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 465 20/8 7/2 7/4 20/10

AD-A285 465 CONTINUED

GEORGIA INST OF TECH ATLANTA SCHOOL OF PHYSICS

(U) Electron-Metastable-Helium Differential and Integral Cross Sections.

DESCRIPTIVE NOTE: Interim rept. 1 Jul 89-30 Jun 94,

92 8P

PERSONAL AUTHORS: Mansky, E. J.; Flannery, M. R.

REPORT NO. GIT-89-016

CONTRACT NO. AFOSR-89-0426

MONITOR: AFOSR, XC
TR-94-0635, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Physics B: Atomic Optical Physics, v25 p1591-1597, 1992. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The differential and integral cross sections for the excitation of the 2(3)P and the 3(3) L (L equivalent S, P and D) states of He from the metastable 2(3)S state are calculated using the semiclassical multichannel eikonal theory with a nine-channel basis set. Comparison is made with the recent experimental results of Mueller-Fiedler et al and Rall et al for the differential and integral cross sections, respectively. The agreement between the present multichannel eikonal results and the experimental data for the 3(3)S and 3(3)D differential cross sections is satisfactory. However, significant differences are noted between the experimental data and the present multichannel eikonal theory for the 2(3)S yielding 2(3)p, 3(3)P differential cross sections.

DESCRIPTORS: (U) *DIFFERENTIAL CROSS SECTIONS, *INTEGRALS, *ELECTRONS, *METASTABLE STATE, *HELIUM, CHANNELS, COMPARISON, CROSS SECTIONS, EXCITATION, EXPERIMENTAL DATA, REPRINTS, MULTICHANNEL, THEORY, SCATTERING, COLLISIONS, ELEMENTARY PARTICLES, PHYSICS, QUANTUM THEORY.

IDENTIFIERS: (U) Eikonal theory, Basis sets, MET(Multichannel Eikonal Theory).

AD-A285 465

AD-A285 465

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 439 20/5 7/4 7/2

GEORGIA INST OF TECH ATLANTA SCHOOL OF PHYSICS

(U) Termolecular Ion-Ion Recombination.

DESCRIPTIVE NOTE: Interim rept. 1 Jul 89-30 Jun 94,

92 15P

PERSONAL AUTHORS: Flannery, M. R.

REPORT NO. GIT-89-017

CONTRACT NO. AFOSR-89-0426

MONITOR: AFOSR, XC
TR-0636, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Macroscopic and microscopic theories of ion-ion recombination in a gas of variable density are provided. Microscopic probabilities for recombination are obtained in the classical absorption limit when one-way collisional transitions from dissociative to bound states are included and bound-free transitions are neglected. Exact analytical probabilities are provided for constant path lengths. (Author)

DESCRIPTORS: (U) *ION ION INTERACTIONS, *ION MOLECULE INTERACTIONS, *RECOMBINATION REACTIONS, REPRINTS, MOLECULAR PROPERTIES, GASES, DENSITY, PROBABILITY, ABSORPTION, COLLISIONS, TRANSITIONS, ELECTRONIC STATES, PATHS, LENGTH.

IDENTIFIERS: (U) *Termolecular, Bound states, Microscopic theory, Macroscopic theory

AD-A285 439

AD-A285 427 6/4 20/1 20/14

OHIO STATE UNIV COLUMBUS DEPT OF SPEECH AND HEARING SCIENCE

(U) Demodulation Processes in Auditory Perception.

DESCRIPTIVE NOTE: Annual rept. 1 Jun 93-31 May 94,

AUG 94 29P

PERSONAL AUTHORS: Feth, Lawrence L.

CONTRACT NO. F49620-93-1-0299

MONITOR: AFOSR, XC
TR-94-0627, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The long range goal of this project is the understanding of human auditory processing of information conveyed by complex, time-varying signals such as speech, music or important environmental sounds. Our work is guided by the assumption that human auditory communication is a 'modulation - demodulation' process. That is, we assume that sound sources produce a complex stream of sound pressure waves with information encoded as variations (modulations) of the signal amplitude and frequency. The listeners task then is one of demodulation. Much of past. psychoacoustics work has been based in what we characterize as 'spectrum picture processing.' Complex sounds are Fourier analyzed to produce an amplitude-by-frequency 'picture' and the perception process is modeled as if the listener were analyzing the spectral picture. This approach leads to studies such as 'profile analysis' and the power-spectrum model of masking. Our approach leads us to investigate time-varying, complex sounds. We refer to them as dynamic signals and we have developed auditory signal processing models to help guide our experimental work.

DESCRIPTORS: (U) *AUDITORY PERCEPTION, AMPLITUDE, AUDITORY SIGNALS, DEMODULATION, HUMANS, MUSIC, PSYCHOACOUSTICS, SIGNAL PROCESSING, SOUND PRESSURE, SPEECH, VARIATIONS, SOUND WAVES, FREQUENCY MODULATION, PITCH DISCRIMINATION, FOURIER ANALYSIS, TIME SERIES ANALYSIS.

IDENTIFIERS: (U) IWAIF(Intensity Weighted Average of

AD-A285 427

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 427 CONTINUED

Instantaneous Frequency), PE61102F, WUAFOSR2313AS

AD-A285 377 6/1 23/5

ARMED FORCES INST OF PATHOLOGY WASHINGTON DC

(U) Inspired Gas Composition Influences Recovery from Experimental Venous Air Embolism.

DESCRIPTIVE NOTE: Final technical rept. 30 Sep 89-29 Jan 90,

91 22P

PERSONAL AUTHORS: Bettencourt, Joseph A.; Harrison, Charles M.; Plemons, Theodore; Schleiff, Patricia L.; Mehm, William J.

CONTRACT NO. AFOSR-89-0543

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XC
TR-94-0632, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This study examined the effect of varying the breathing gas mixture on recovery from an experimentally induced venous air embolism (VAE). The specific objectives of this study were as follows: (1) To assess the lungs ability to dissipate a second air embolism. (2) To compare treatment gas breathing to air breathing with regard to: (a) Maximum change in physiological variables; (b) Length of time taken for the return to baseline of physiological variables; (c) Amount of residual intravascular air; and (d) Frequency with which venous air emboli are passed to the arterial circulation.

DESCRIPTORS: (U) *EMBOLISM, *PULMONARY ARTERIES, *BREATHING GASES, OXYGEN, NITROGEN, SULFUR, INFUSIONS, HYPERVENTILATION, HYPEROXIA, NITROUS OXIDE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 361 7/6 20/6 7/4 7/3

CARNEGIE-MELLON UNIV PITTSBURGH PA

(U) Physical-Chemical Studies on Rodlike Polymer Compositions.

DESCRIPTIVE NOTE: Final rept.,

SEP 94 65P

PERSONAL AUTHORS: Berry, G. C.

CONTRACT NO. F49620-92-J-0281

MONITOR: AFOSR, XC
TR-94-0634, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Third harmonic generation (THG) is used to study the third-order nonlinear optical properties of nematic and isotropic solutions of poly(phenylene benzobisthiazole), PBZT, and related small molecule model compounds. Maker fringe patterns (MFP) for isotropic preparations are analyzed in terms of postulated surface layers comprising regions in which the rodlike chains tend to have their axes parallel to the plane of the surface, creating a negatively birefringent uniaxial nematic layer. The THG with the nematic solution exhibits intensity with polarization components unexpected for uniaxial nematic symmetry, along with other unexpected features in the MFP. This behavior is attributed to the effects of surface layers, postulated to exhibit biaxial nematic symmetry, in which the uniaxial nematic symmetry is broken in regions on the scale of a wavelength. Features of the texture of the nematic phase of PBZT solutions are discussed. The nature of twist-loop defects in the texture is described, along with certain defects in the form of an ellipsoid of revolution, postulated to result from a molecular weight fractionation in the heterodisperse polymer. Light scattering studies on dilute solutions of a poly(n-dodecyl thiophene) are given to elucidate supramolecular structure that leads to a thermochromic effect. The supramolecular structure may play a role in the molecular organization in the solid state, with influence on electronic and nonlinear optical behavior.

DESCRIPTORS: (U) *POLYMERS, *CHEMICAL COMPOSITION,

AD-A285 361

AD-A285 361 CONTINUED

*PHYSICAL PROPERTIES, *CHEMICAL PROPERTIES, AXES, CHAINS, ELECTRONICS, ELLIPSOIDS, FRACTIONATION, INTENSITY, LAYERS, LIGHT SCATTERING, MODELS, MOLECULAR WEIGHT, OPTICAL PROPERTIES, PATTERNS, PHASE, POLARIZATION, REGIONS, SCALE, STRUCTURES, SURFACES, SYMMETRY, TEXTURE, THIOPHENES, THIRD HARMONIC GENERATION, WEIGHT, NONLINEAR OPTICS, BIREFRINGENCE, AXIAL FLOW, DISPERSIONS, SOLID STATE CHEMISTRY.

IDENTIFIERS: (U) Nematic solution, Isotropic solution, Supramolecular, PBZT(Polyphenylene Benzobisthiazole), Phenylene, Benzobisthiazole, MFP(Maker Fringe Patterns)

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 360 20/4

ILLINOIS UNIV AT URBANA

(U) Structure and Dynamics of Turbulent Wall Layers.

DESCRIPTIVE NOTE: Final rept. 1 Mar 90-31 May 94,

JUN 94 11P

PERSONAL AUTHORS: Adrian, Ronald J.

CONTRACT NO. AFOSR-90-0169

MONITOR: AFOSR, XC
TR-94-101, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The three-dimensional structure of the turbulent motion of fluid flowing close to a surface has been studied using the technique of linear mean square stochastic estimation to find estimates of the flow field when certain events occur in the flow. The structures given the velocity at one point have been documented, and their dynamic evolution is being studied. It is shown that they are long-lived. One-point events provide insight into the physical bases of closure approximations in one-point moment closures, and they have been used to provide a new closure approximation for the fast pressure-strain correlation. Stochastic estimation is used as a means of defining three-dimensional, dynamic wall boundary conditions for large eddy simulations. Turbulence structure, Wall turbulence.

DESCRIPTORS: (U) *FLOW FIELDS, *TURBULENCE, CORRELATION, ESTIMATES, MOMENTS, PRESSURE, SURFACES, THREE DIMENSIONAL, VELOCITY, WALLS, COMPUTATIONAL FLUID DYNAMICS, INVISCID FLOW, NAVIER STOKES EQUATIONS, BOUNDARY LAYER, EDDIES(FLUID MECHANICS), CHANNEL FLOW, VORTICES, SHEAR STRESSES, APPROXIMATION(MATHEMATICS), STOCHASTIC CONTROL, COMPUTERIZED SIMULATION.

IDENTIFIERS: (U) WUAFOSR2307A2.

AD-A285 353 6/4

BARNARD COLL NEW YORK

(U) Diffusible Driving and Coupling Signals of the Biological Clock.

DESCRIPTIVE NOTE: Final rept. 1 Apr 92-31 Mar 94,

JUL 94 5P

PERSONAL AUTHORS: Silver, Rae

CONTRACT NO. F49620-92-J-0195

PROJECT NO. 2312

TASK NO. CS

MONITOR: AFOSR, XC
TR-94-0591, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The goal of the research has been to determine whether there is evidence of a diffusible coupling signal from the Suprachiasmatic Nucleus. If a diffusible signal is physiologically significant, it has the potential for use as a bioactive agent for exogenous administration. We believe we now have evidence that such a signal exists, and that it can appear in biologically significant amounts in the cerebrospinal fluid. At the present time we are working to complete the most definitive experiments providing such proof. We are also working towards our next goal: to establish the experimental conditions for identifying the diffusible signal.

DESCRIPTORS: (U) *CEREBROSPINAL FLUID, *BIOLOGICAL RHYTHMS, MANAGEMENT, SIGNALS, BRAIN, METABOLISM, MEDICAL RESEARCH, COUPLING(INTERACTION).

IDENTIFIERS: (U) WUAFOSR2312CS, PE61102F, SCN(Suprachiasmatic Nucleus)

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 352 12/4

CALIFORNIA UNIV LOS ANGELES

(U) Digital Adaptive and Optimal Control of Distributed Systems.

DESCRIPTIVE NOTE: Final rept. 1 Oct 90-31 Dec 93,

DEC 93 57P

PERSONAL AUTHORS: Gibson, J. S.

CONTRACT NO. AFOSR-91-0016

PROJECT NO. 2304

TASK NO. AS

MONITOR: AFOSR, XC
TR-94-0584, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Research on optimal and adaptive control and adaptive identification of distributed systems has been performed. Most of the research has focused on digital control and identification methods, to allow for real-time implementation. The main applications have been to identification and control of flexible structures. Both new mathematical theory and new numerical methods have been primary objectives and results of the research. Experimental application of the new methods for adaptive identification and disturbance rejection has been carried out.

DESCRIPTORS: (U) *FLEXIBLE STRUCTURES, *ADAPTIVE CONTROL SYSTEMS, IDENTIFICATION, REAL TIME, THEORY, DIGITAL SYSTEMS, CONTROL THEORY.

IDENTIFIERS: (U) WUAFOSR2304AS, PE61102F.

AD-A285 324 7/4 20/10 7/2

GEORGIA INST OF TECH ATLANTA SCHOOL OF PHYSICS

(U) Empirical and Semiempirical Interaction Potentials for Rare Gas-Rare Gas and Rare Gas-Halide Systems,

AUG 93 18P

PERSONAL AUTHORS: Flannery, M. R.; Mansky, E. J.

REPORT NO. GIT-89-018

CONTRACT NO. AFOSR-89-0426

MONITOR: AFOSR, XC
TR-94-0637, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v99 n3 p1962-1977, 1 Aug 93. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Six reprints of Empirical and Semiempirical Interaction Potentials for Rare Gas-Rare Gas and Rare Gas-Halide Systems , by E. J. Mansky and M. R. Flannery. Published in J. Chem. Phys. 99 (1993) 1962-77.

DESCRIPTORS: (U) *HALIDES, *INTERACTIONS, *RARE GASES, *RARE GASES, REPRINTS, ARGON, NEON, COMPUTATIONS, QUANTUM THEORY, XENON, IODINE, BROMINE, KRYPTON, FLUORINE, IONS, CHLORINE, ATOMS, ARGON, NEON.

IDENTIFIERS: (U) Chemical physics, *Empirical, *Semiempirical, *Potentials, Exciplexes, Ab Initio, Negative ions

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 323 7/4 11/6.1 1/3 20/6

DACCO SCI INC COLUMBIA MD

(U) The Use of Electrochemistry and Ellipsometry for Identifying and Evaluating Corrosion on Aircraft.

DESCRIPTIVE NOTE: Annual rept.,

SEP 94 2P

PERSONAL AUTHORS: Dacres, Chester M.

CONTRACT NO. F49620-94-C-0042

PROJECT NO. 3005

TASK NO. SS

MONITOR: AFOSR, XC
TR-94-0640, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Electrochemical corrosion testing using AC Impedance measurements, ellipsometry and X-Ray Photoelectron Spectroscopy (XPS) is progressing according to the Plan of Action and Milestones (POAM) submitted in July, 1994. The development of the corrosion sensor is on schedule and the feasibility study shows that the proposal to build the sensor is technically sound. A detailed report dated August 15, 1994 was presented to the Program Manager explaining the theory of the AC Impedance, ellipsometry and XPS. The report also explained what the physical concept of the corrosion monitor is, and how it will respond to the various stages of corrosion. The preliminary data presented in the report showed the 'signature' of the initial stages of corroding aircraft structures

DESCRIPTORS: (U) *ELECTROCHEMISTRY, *ELLIPSOMETERS, *CORROSION, *AIRCRAFT, *OPTICAL EQUIPMENT, *LIGHT, *POLARIZATION, IDENTIFICATION, TEST AND EVALUATION, STRUCTURES, IMPEDANCE, ALTERNATING CURRENT, X RAY PHOTOELECTRON SPECTROSCOPY, DETECTION.

IDENTIFIERS: (U) SBIR, WUAFOSR3005SS, PE65502F

AD-A285 323

AD-A285 321 20/5 11/4 7/6

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF MATERIALS SCIENCE AND ENGINEERIN G

(U) Workshop on Synthesis of Macromolecules with Precisely Controlled Structure for New Materials.

DESCRIPTIVE NOTE: Final rept. 1 Mar 93-28 Feb 94,

FEB 94 4P

PERSONAL AUTHORS: Thomas, Edwin L.

CONTRACT NO. F49620-93-1-0175

PROJECT NO. 2303

TASK NO. D3

MONITOR: AFOSR, XC
TR-94-0631, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Recent development on the theoretical and synthetic experimental fronts mean that we can better tailor, characterize and understand materials based on macromolecule. Macromolecules can now be prepared by a wide range of synthetic techniques that result in polymers with very well-defined composition, architecture and molecular weight. A variety of theories, including those describing melt dynamics, liquid crystallinity and microphase organization, are sufficiently well-developed to enable prediction of particular polymer compositions are chain structures exhibiting unique properties. Theories are just starting to possess sufficient molecular detail such, that they are synthetically suggestive, thereby enabling chemists to translate the parameters into actual substances. New experimental techniques permit critical testing of theories on small-scale quantities of model materials. Computer simulations and molecular modeling are increasingly powerful tools to guide us in polymer design. However, with these new capabilities arise questions of how best to implement and exploit them. The capabilities on both the chemical & physical communities are now such that specific collaborations will certainly bear fruit. The interplay of theory & experiment, as well as physics & chemistry, is leading to mutual inspiration, providing a better tie

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between the predictive power of theory and materials synthesis.

DESCRIPTORS: (U) *MACROMOLECULES, *POLYMERS, *STRUCTURES, *COMPOSITE MATERIALS, ARCHITECTURE, CHAINS, CHEMICALS, CHEMISTRY, COMPUTERS, DYNAMICS, MATERIALS, MEAN, MELTS, MODELS, MOLECULAR WEIGHT, PARAMETERS, PHYSICS, PREDICTIONS, QUANTITY, SCALE, SIMULATION, SYNTHESIS, TOOLS, WORKSHOPS, CONTROL, LIQUID CRYSTALS.

IDENTIFIERS: (U) WUAFOSR2303D3, PE61102F, Microphase

AD-A285 319 20/6 20/10 9/4 6/5

MASSACHUSETTS INST OF TECH CAMBRIDGE RESEARCH LAB OF ELECTRONICS

(U) Reprints from RLE Progress Report Number 136, Chapters 1.13.4 thru 1.16,

DEC 93 11P

PERSONAL AUTHORS: Fujimoto, James G.

PROJECT NO. 2312

TASK NO. AS

MONITOR: AFOSR, XC
TR-94-0596, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in RLE Progress Report Number 136, p118-124, 1 Jan-31 Dec 93. Available only to DTIC users. No copies furnished by NTIS.

Reprint: Reprints from RLE Progress Report Number 136, Chapters 1.13.4 thru 1.16.

DESCRIPTORS: (U) *OPTICS, *QUANTUM ELECTRONICS, SCANNING, TUNNELING, MICROSCOPY, REPRINTS, LASERS, MEDICINE, COHERENCE, TOMOGRAPHY, OPHTHALMOLOGY, PULSES, NIOBIUM, DIAGNOSIS(MEDICINE).

IDENTIFIERS: (U) WUAFOSR2312AS, Time gated, Ultrashort pusle laser scalpel

AD-A285 318 25/2 25/4

MASSACHUSETTS INST OF TECH CAMBRIDGE RESEARCH LAB OF ELECTRONICS

(U) Reprints from RLE Progress Report Number 136, Chapters 1.6 thru 1.61,

DEC 93 6P

PERSONAL AUTHORS: Durlach, Nathaniel

CONTRACT NO. AFOSR-90-0200

PROJECT NO. 2313

TASK NO. CS

MONITOR: AFOSR, XC
TR-94-0595, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in RLE Progress Report Number 136, p379-380, 1 Jan-31 Dec 93. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) We envision a microphone array system that resolves incoming signals into simultaneous directional channels followed by a coding operation that transforms these resolved signals so that resolution is preserved at the perceptual level after the signals are summed for presentation either to one or two ears. Such a system would permit even a monaural listener to monitor all directions simultaneously, detect and localize in the same operation, and focus on a single direction

DESCRIPTORS: (U) *MICROPHONES, *SPEECH TRANSMISSION, AUDITORY SIGNALS, ALGORITHMS, SPATIAL DISTRIBUTION, ACOUSTIC ARRAYS, MAN MACHINE SYSTEMS, REPRINTS.

IDENTIFIERS: (U) WUAFOSR2313CS.

AD-A285 318

AD-A285 317 11/6 20/2 9/1 7/2

ARIZONA STATE UNIV TEMPE CENTER FOR SOLID STATE SCIENCE

(U) Heteroepitaxy of Ternary SiGeC Alloys on Si for Bipolar Transistors.

DESCRIPTIVE NOTE: Final rept.,

JUL 94 12P

PERSONAL AUTHORS: Mayer, James W.

CONTRACT NO. F49620-93-C-0022

PROJECT NO. A309

TASK NO. 01

MONITOR: AFOSR, XC
TR-94-0629, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The final report covers (1) The development of synthetic methods and detailed phase and compositional characterization of our cubic SiC-GeC solid solutions and diamond structured SiGeC thin films (2) Our preliminary findings on bandgap measurements (3) The development of a novel technique for in situ observation of SiGeC CVD in an environmental electron microscope. We used this technique to deposit films that are lattice matched to Silicon. The work was carried out in the Chemical Vapor Deposition Laboratory (by graduate student Michael Todd, postdoctoral research associate Philippe Bonneau, and Professor John Kouvetakis) and the Ion Beam Facility (Barry Wilkens), with assistance from the staff of the High Resolution Electron Microscopy Group (Dr. Renu Sharma, and Professor David Smith) at Arizona State University. Vibrational characterization and bandgap studies were carried out by Nigel Cave at Motorola Phoenix.

DESCRIPTORS: (U) *SILICON, *EPITAXIAL GROWTH, *TERNARY COMPOUNDS, *ALLOYS, *GERMANIUM, *CARBIDES, *BIPOLAR TRANSISTORS, DEPOSITS, ELECTRON MICROSCOPES, ELECTRON MICROSCOPY, HIGH RESOLUTION, ION BEAMS, LABORATORIES, MEASUREMENT, MICROSCOPY, OBSERVATION, PHASE, SOLID SOLUTIONS, THIN FILMS, SYNTHESIS, CHEMICAL VAPOR DEPOSITION.

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AD-A285 317 CONTINUED

IDENTIFIERS: (U) PE61101E, WUAFOSRA30901, *Heteroepitaxy, Cubic, Bandgap, Lattice matched

AD-A285 316 20/14 12/1 25/4

DENVER UNIV CO COLL OF ENGINEERING

(U) Signal Processing via Fourier-Bessel Series Expansion.

DESCRIPTIVE NOTE: Final rept.,

MAY 94 37P

PERSONAL AUTHORS: Schroeder, Jim

CONTRACT NO. F49620-93-1-0271

PROJECT NO. 2304

TASK NO. ES

MONITOR: AFOSR, XC
TR-94-0630, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) In many cases it may not be desirable or even practical to represent a signal by its sample values directly or by an analytical function if a suitable function is available. For example, a signal may be determined by time domain sample values when the parameters of interest are more compact within the frequency domain. Many practical signals are highly redundant, both image and speech signals fall into this category, and it may be desirable and possibly necessary to represent the signal with a fewer number of samples for economy of storage and/or transmission bandwidth limitations. Whatever the desired goal the processing of signals can often be carried out more efficiently in another domain than that of the original signal. An obvious example here with the advent of hardware Fast Fourier Transform (FFT) devices is the widespread frequency domain processing of naturally occurring time domain signals. Pattern recognition techniques rely on the ability to generate a set of coefficients from the raw data (time domain samples) that are more compact (i.e. fewer samples) and we hope, are more closely related to the signal characteristics of interest. Clearly, if one is interested in frequency content, a Fourier series representation packs the frequency information in to fewer samples (Fourier series coefficients) than a time domain representation.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 316 CONTINUED

DESCRIPTORS: (U) *FAST FOURIER TRANSFORMS, *SIGNAL PROCESSING, BANDWIDTH, DECOMPOSITION, GAUSSIAN NOISE, MATHEMATICAL FILTERS, TRANSFORMERS, FOURIER SERIES, FREQUENCY DOMAIN, IMAGE PROCESSING, BESSEL FUNCTIONS, ALGORITHMS, TIME SERIES ANALYSIS, COMPUTATIONS, NOISE REDUCTION, PARAMETERS, PATTERN RECOGNITION, MATHEMATICAL MODELS, COMPUTERIZED SIMULATION, COMPARISON, SPECIFICATIONS, TIME DOMAIN, VALUE.

IDENTIFIERS: (U) WUAFOSR2304ES, *Fourier Bessel Series, Hankel transformation, Gibbs phenomena

AD-A285 316

AD-A285 310 9/5 20/6

BRIMROSE CORP OF AMERICA BALTIMORE MD

(U) A Novel Optic Bistable Device with Very Low Threshold Intensity Using Photorefractive Films.

DESCRIPTIVE NOTE: Final rept.,

AUG 94 25P

PERSONAL AUTHORS: Wang, Sean X.; Sun, Yuankun; Trivedi, Sudhir B.; Li, Guifang

CONTRACT NO. F49620-93-C-0070

PROJECT NO. 1602

TASK NO. 01

MONITOR: AFOSR, XC
TR-94-0593, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Brimrose Corporation of America reports the successful completion of the SBIR Phase I research in low-threshold intensity optical bistable devices using photorefractive nonlinearity. A thin photorefractive film optical bistable device was proposed in the Phase I proposal. The feasibility of this device was theoretically investigated. The theoretical feasibility study formulates the materials requirements in such a kind of configuration for Phase II research. In addition, we have proposed and investigated another configuration of optical bistable devices that do not require advanced photorefractive materials, namely, the self-pumped phase conjugator. We have successfully demonstrated a low-threshold optical bistable operation in a KNSBN:CU crystal. To the best of our knowledge, the threshold of 650 mW/sq. cm is the lowest of its kind to be achieved so far. Optical communications, Bistability, Two-beam coupling, Photofractivity, Optical computing, Neural network

DESCRIPTORS: (U) *OPTICAL COATINGS, *ELECTROOPTICS, BISTABLE DEVICES, CONFIGURATIONS, REFLECTIVITY, THIN FILMS, CRYSTALS, FEASIBILITY STUDIES, SEMICONDUCTORS, REFRACTION, NEURAL NETS, OPTICAL COMMUNICATIONS, CRYSTAL GROWTH.

AD-A285 310

AD-A285 310 CONTINUED

IDENTIFIERS: (U) WUAFOSR160201, SBIR, *Photorefractive materials, Phase conjunction

AD-A285 296 7/4 7/2 20/5

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF CHEMISTRY

(U) Potential Energy Surfaces for the Interaction of BH with AR and a Theoretical Investigation of the Stretch-Bend Levels of the ArBH(A) Van Der Waals Molecule.

AUG 94 17P

PERSONAL AUTHORS: Alexander, Millard H.; Gregurick, Susan; Dagdigian, Paul J.

CONTRACT NO. AFOSR-91-0363

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XC
TR-94-0615, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemistry and Physics, v101 n4 p.2887-2902, 15 Aug 94. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) New multi-reference, configuration-interaction potential energy surfaces are reported for the interaction of Ar with the BH radical in its ground X(1) Sigma (+) and first excited A(1) pi electronic states. These potential energy surfaces are then used with an adiabatic bender model for the calculation of the vibrational energy levels of the ArBH van der Waals complex in its ground and first excited singlet electronic states. Comparison of vibrational energies calculated using this adiabatic bender model with computed exact vibrational energies indicates that the former provides a very useful description of the bound levels of the ArBH complex. A qualitative discussion of the expected features in the A(1)pi-X(1) Sigma (+) electronic spectrum of ArBH is also presented, to facilitate comparison with the experimental ArBH spectrum reported in the following paper E. Hwang and P. J. Dagdigian, J. Chem. Phys. 101, 2903 (1994). The most strongly bound ArBH(A) levels, with Ar-BH separations less than in the ground state ArBH(X) complex, correspond to motion described primarily by the more attractive V sub A' potential energy surface and to a helicopter-like

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internal motion of the BH moiety. For the more weakly bound states supported by higher bender curves, the vibrational motion cannot be described as occurring on either the V sub A' or V sub A' potential energy surfaces separately. Non-bonding interactions, BH, Electronic spectroscopy

DESCRIPTORS: (U) *BORON HYDRIDES, *ARGON, *VAN DER WAALS FORCES, *INTERACTIONS, *POTENTIAL ENERGY, *SURFACES, BONDING, COMPARISON, CONFIGURATIONS, ELECTRONIC STATES, ELECTRONICS, ENERGY LEVELS, GROUND STATE, INTERNAL, MODELS, MOTION, EXCITATION, SEPARATION, SPECTROSCOPY, VIBRATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1, *Stretch-bend levels, Bender model, Chemical physics.

AD-A285 287 20/5 7/4 12/2

GEORGIA INST OF TECH ATLANTA SCHOOL OF PHYSICS

(U) Microscopic and Macroscopic Theories of Termolecular Recombination Between Atomic Ions.

DESCRIPTIVE NOTE: Interim rept. 1 Jul 89-30 Jun 94,

93 15P

PERSONAL AUTHORS: Flannery, M. R.

MONITOR: AFOSR, XC
TR-94-0639, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Dissociative Recombination: Theory, Experiment and Applications, NATO-ASI Series B 313, p205-219 1993. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Six reprints of 'Microscopic and Macroscopic Theories of Termolecular Recombination between Atomic IOns', in 'Dissociative Recombination: Theory, Experiment and Applications , by M. R. Flannery. NATO-ASI Series B 313 (1993) 205-19, B. R. Rowe and J. B. A. Mitchell (eds.), Plenum Press, N.Y.

DESCRIPTORS: (U) *DIFFERENTIAL EQUATIONS, *ATOMIC PROPERTIES, *IONS, NATO, REPRINTS, THEORY, REACTION KINETICS, ABSORPTION, RATES, COLLISIONS, TRANSPORT.

IDENTIFIERS: (U) *Termolecular recombinations, Gas density, Master equations, Pair distributions.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 276 7/4 11/6.1 1/3

DACCO SCI INC COLUMBIA MD

(U) The Use of Electrochemistry and Ellipsometry for identifying and Evaluating Corrosion on Aircraft.

DESCRIPTIVE NOTE: Annual rept. 15 Jul-14 Aug 94,

AUG 94 2P

PERSONAL AUTHORS: Dacres, Chester M.

CONTRACT NO. F49620-94-C-0042

PROJECT NO. 3005

TASK NO. SS

MONITOR: AFOSR, XC
TR-94-0607, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Aluminum 2024-T3 samples have been purchased, machined and coated. Electrochemical corrosion testing is in the process of being performed on these samples, using AC impedance measurement, ellipsometry and X-Ray Photoelectron Spectroscopy (XPS). Electrochemical impedance measurements are being used to acquire a precise impedance signature which will be used to develop a sensor for detecting corrosion processes on aircraft. The objective of this Phase 1 project is to show that a distinct signature obtained from a corroding aircraft surface can be used to develop a sensor. Data have been collected using AC impedance testing and X-Ray Photoelectron Spectroscopy

DESCRIPTORS: (U) *ELECTROCHEMISTRY, *ELLIPSOMETERS, *CORROSION, *AIRCRAFT, *ALUMINUM ALLOYS, IDENTIFICATION, TEST AND EVALUATION, MACHINING, COATINGS, IMPEDANCE, MEASUREMENT, ALTERNATING CURRENT, X RAY PHOTOELECTRON SPECTROSCOPY, DETECTORS, SURFACES.

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AD-A285 262 7/1 7/2 11/6.1

ROCKWELL INTERNATIONAL THOUSAND OAKS CA SCIENCE CENTER

(U) Processing - Property Relationship in Advanced Intermetallics.

DESCRIPTIVE NOTE: Final rept. 4 Mar 91-3 Mar 94,

JUL 94 66P

PERSONAL AUTHORS: Hardwick, D. A.; Martin, P. L.

REPORT NO. SC71047.FR

CONTRACT NO. F49620-91-C-0027

MONITOR: AFOSR, XC
TR-94-0567, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The feasibility of using the exothermic reaction between Mo and Si for the synthesis of MoSi2 has been demonstrated. The reaction-HIP process begins with high purity elemental powder and produces a low oxygen, fully-dense MoSi2 with a grain size of approx. 40 micrometers. All of the powder handling steps were done in a low oxygen, inert gas environment to explore the limits of the precautions that are necessary to eliminate SiO2 contamination. Compression testing of reactively HIP processed material showed that this material enjoys a strength advantage over material processed by HIP from commercial powder. The compression testing was done as a function of temperature, in the range 1200-1450 deg C, and of strain rate, in the range 10(exp-3) to 10(exp-5) per second. The deformation mechanism was determined to be a combination of microcracking and dislocation glide+climb. Large strain deformation resulted in dynamic of the recrystallization MoSi2. Backscatter SEM and EM were used to characterize the deformed microstructures

DESCRIPTORS: (U) *INTERMETALLIC COMPOUNDS, *SYNTHESIS(CHEMISTRY), *MOLYBDENUM COMPOUNDS, COMPRESSION, DEFORMATION, DISLOCATIONS, EXOTHERMIC REACTIONS, SILICIDES, HOT PRESSING, GRAIN SIZE, MICROCRACKING, MICROSTRUCTURE, CREEP, STRESS STRAIN RELATIONS, OXYGEN, POWDERS, PURITY, SILICON, STRAIN RATE, TEMPERATURE, TEST AND EVALUATION.

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IDENTIFIERS: (U) *Molybdenum disilicide, HIP(Hot Isostatic Pressing)

AD-A285 260 7/6 20/3 20/6 7/4

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

(U) Multifunctional Heterostructures for Photonics.

DESCRIPTIVE NOTE: Final rept. 1 Jun 91-31 May 93,

MAY 93 18P

PERSONAL AUTHORS: Prassad, Paras N.

CONTRACT NO. F49620-91-C-0053

PROJECT NO. 1601

TASK NO. 08

MONITOR: AFOSR, XC
TR-94-0610, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of the research performed was: (1) development of electrooptic polymers which are usable in the visible, (2) use of sol-gel chemistry to improve on processability and bulk characteristics for waveguide applications, and (3) introduction of multifunctionality by composite approach. These objectives were met. For second-order nonlinearity needed for electrooptic effects, we had great success in the design of new types of chromophores with enhanced X(2) and transparency in the visible. Our unique contributions are: (1) inorganic:organic composites for nonlinear optics; (2) successful poling of molecular-ionic polymers with high nonlinearity; (3) novel processing to produce poled sol-gel silica/ titania doped with electrooptic chromophores; (4) planar optical waveguides using sol-gel processing; and (5) combination of electrooptic function with photoconductivity to produce photorefractive polymers with a figure of merit comparable to that of existing inorganic photorefractive systems. The Langmuir-Blodgett method of film deposition was also investigated. The advantage of this method is that it provides a higher order parameter than a poled structure.

DESCRIPTORS: (U) *ELECTROOPTICS, *PHOTONICS, CHEMISTRY, CHROMOPHORES, DEPOSITION, FIGURE OF MERIT, FILMS, FUNCTIONS, NONLINEAR OPTICS, OPTICAL WAVEGUIDES, PARAMETERS, PHOTOCONDUCTIVITY, POLYMERS, PROCESSING,

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

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STRUCTURES, TRANSPARENCIES, WAVEGUIDES, VISIBLE SPECTRA, COMPOSITE MATERIALS, ORGANIC MATERIALS, INORGANIC MATERIALS, MOLECULAR PROPERTIES, IONS, SILICA GELS, TITANIUM OXIDES, DOPING.

IDENTIFIERS: (U) PE63218C, WUAFOSR160106, *Multifunctional heterostructures, Sol gel process, Poling, Photorefractive, Langmuir Blodgett method

AD-A285 255 20/6 9/5 7/6

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF CHEMISTRY

(U) Development of Device Quality Nonlinear Optical Materials and Definition of Mechanisms of Optical Nonlinearity.

DESCRIPTIVE NOTE: Final rept. 1 Jun 91-31 May 94,

SEP 94 104P

PERSONAL AUTHORS: Dalton, Larry R.

MONITOR: AFOSR, XC
TR-94-0611, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The following objectives were defined and pursued: (1) Synthesis of chromophores characterized by large hyperpolarizability and good thermal stability, (2) covalent coupling of nonlinear optical chromophores to polymer matrices, (3) lattice hardening reactions which permit locking-in of electric field poling-induced macroscopic noncentrosymmetric order, (4) definition of mechanisms of optical nonlinearity and development of improved instrumentation to effect such characterization, (5) exploration of methods of enhancing optical nonlinearity and electromagnetic field intensities within-materials (e.g., exploration of cascading effects and morphological resonances). Substantial success was achieved in each of these areas with more than sixty publications resulting from AFOSR support. Electro-optic modulation, Directional couplers, Optical memories, Waveguide amplifiers, Room temperature spectral hole burning, DEC Chromophores, Femtosecond spectroscopy

DESCRIPTORS: (U) *CHROMOPHORES, *ELECTROOPTICS, *NONLINEAR OPTICS, *POLYMERS, AMPLIFIERS, OPTICAL MATERIALS, ELECTRIC FIELDS, ELECTROMAGNETIC FIELDS, OPTICAL WAVEGUIDES, THERMOSETTING PLASTICS, HARDENING, BIREFRINGENCE, OPTICAL PROPERTIES, COPOLYMERS, ROOM TEMPERATURE, SPECTROSCOPY, SYNTHESIS(CHEMISTRY), MOLECULAR BEAMS, THERMAL STABILITY, WAVEGUIDES, EPITAXIAL GROWTH.

IDENTIFIERS: (U) Molecular beam epitaxy

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 253 7/3 7/2 11/4 7/6

NORTH DAKOTA STATE UNIV FARGO

(U) New Approaches to Novel Organosilanes.

DESCRIPTIVE NOTE: Final technical rept. 1 Apr 93-31 Mar 94,

APR 94 21P

PERSONAL AUTHORS: Boudjouk, Philip

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XC
TR-94-0599, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes the results of research in the following areas: 1 -The completion of a project on di-t-butylsilylene. 2-A novel route to binary semiconducting materials composed from the elements tin, germanium, lead, sulfur, selenium, and tellurium. 3-A new method of making ternary composites using the elements mentioned in 2. 4-The development of convenient procedures for making gallium arsenide, gallium phosphide and indium phosphide. 5-Expansion of the chemistry of siliranes. 6-The synthesis of three stable aromatic species containing silicon. 8-The synthesis of the first stable adduct of dichlorosilane 9-The initial studies on the synthesis of silicon-based dendrimers. 10-The initial studies on the synthesis of doped silicon carbides. 11-The development of a new procedure for preparing very high molecular weight polysilanes. Silicon, Tin, Germanium, Lead, Sulfur, Selenium, Tellurium, Gallium arsenide, Indium phosphide, Silicon carbide, Hydrosilylation, Catalysis, Ultrasound, Activated nickel, Copper-amine catalysis, Semiconductors, Siliranes, Tin sulfide, Tin selenide, Silylenes

DESCRIPTORS: (U) *SILICON CARBIDES, *SILANES, *ORGANIC COMPOUNDS, AMINES, CATALYSIS, CHEMISTRY, COPPER, EXPANSION, GALLIUM, GALLIUM ARSENIDES, GALLIUM PHOSPHIDES, GERMANIUM, INDIUM PHOSPHIDES, MOLECULAR WEIGHT, NICKEL, POLYSILANES, SELENIDES, SELENIUM, SEMICONDUCTORS, SULFIDES, SULFUR, SYNTHESIS, TELLURIUM, TIN, CHEMICAL

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COMPOUNDS, COMPOSITE MATERIALS, LEAD(METAL), BINARY COMPOUNDS, TERNARY COMPOUNDS, POLYMERS.

IDENTIFIERS: (U) PE61102E, WUAFOSR2303B2, Butylsilylenes, Dichlorosilanes, Dendrimers, Hydrosilylation, Ultrasound, Activated, Siliranes, Silylenes, Starburst

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 249 7/6 11/4 19/1

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF MECHANICAL ENGINEERING

(U) Phase Transformations, Ultrastructure and Properties of Rigid-Rod Fibers.

DESCRIPTIVE NOTE: Final rept.,

MAR 94 9P

PERSONAL AUTHORS: Thomas, Edwin L.

CONTRACT NO. AFOSR-91-0078

PROJECT NO. 2303

TASK NO. CS

MONITOR: AFOSR, XC
TR-94-0609, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The proposal was directed towards the fundamental understanding of two areas of polymer materials: (1) Phase Transformations and Microstructure, (2) Ultrastructure and Mechanical Properties. Years 1 and 2 were primarily concerned with rigid rod PBX-type materials. During Year 2 and especially in Year 3 emphasis was redirected toward technique development (AFM and LVHRSEM) for materials characterization, and materials processing (roll casting of block copolymers and magnetic field alignment of liquid crystalline polymers). As well, efforts shifted to block copolymer materials during the second half of the grant. Collaborative efforts with Professor P. Prasad at the University of Buffalo (sol-gel composites) and Professors S. Gruner and P. Chaikin at Princeton University (phase transitions and nanolithographic uses of block copolymers) were quite successful

DESCRIPTORS: (U) *PLASTIC BONDED EXPLOSIVES, *POLYMERS, *COMPOSITE MATERIALS, ALIGNMENT, BLOCK COPOLYMERS, CASTING, COPOLYMERS, MAGNETIC FIELDS, MATERIALS, MECHANICAL PROPERTIES, PHASE, PHASE TRANSFORMATIONS, PROCESSING, RODS, ROLL, TRANSFORMATIONS, MICROSTRUCTURE, LIQUID CRYSTALS, FIBERS, GRAIN BOUNDARIES.

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IDENTIFIERS: (U) PE61102F, WUAFOSR2303CS, Sol gels

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 239 12/5 12/9

WASHINGTON UNIV SEATTLE

(U) Communicating Situation Awareness in Virtual Environments.

DESCRIPTIVE NOTE: Interim rept. 15 May 93-14 May 94,

AUG 94 60P

PERSONAL AUTHORS: Wells, Maxwell J.

CONTRACT NO. F49620-93-1-0339, $AFOSR-94-1

PROJECT NO. 3484

TASK NO. HS

MONITOR: AFOSR, XC
TR-94-0604, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The report documents the first year of work on a four-year project titled Communicating Situation Awareness in Virtual Environments. Included in the report are references to the fifteen papers that were produced, and descriptions of eleven of the research projects that were started. In addition, there is a description of a workshop on virtual reality which was hosted at the University of Washington, and which was attended by 10 federal labs. Other work performed during the period and described in the report includes the conceptual and software development of a virtual world (the Towering Inferno) for performing experimental manipulations, and the detailed design of a virtual reality testbed. As a part of the infrastructure for this line of research, a knowledge base was also developed. This knowledge base is structured to be compatible with ongoing efforts for electronic storage and retrieval of information. Ten objectives of the research effort are detailed. The report provides substantive evidence that the project is on schedule, and making effective use of the available facilities and support. Situation awareness, Virtual environments, Presence, Metrics

DESCRIPTORS: (U) *INTERACTIVE GRAPHICS, *KNOWLEDGE BASED SYSTEMS, AWARENESS, ELECTRONICS, STORAGE, COMPUTER COMMUNICATIONS, SOFTWARE ENGINEERING, THREE DIMENSIONAL,

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AD-A285 239 CONTINUED

COMPUTER GRAPHICS, INFORMATION EXCHANGE, OPTIMIZATION, REAL TIME, DECISION MAKING, PATTERN RECOGNITION, HIGH RESOLUTION, IMAGE PROCESSING.

IDENTIFIERS: (U) PE61103D, WUAFOSR3484HS, *Virtual reality, Situation awareness

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 238 17/7 16/2

CALIFORNIA UNIV LOS ANGELES DEPT OF MECHANICAL AEROSPACE AND NUCLEAR ENGINEER ING

(U) Robust and Adaptive Guidance and Control Laws for Missile Systems.

DESCRIPTIVE NOTE: Final rept. 7 Nov 90-31 Oct 93,

JUN 94 37P

PERSONAL AUTHORS: Speyer, Jason L.

CONTRACT NO. AFOSR-91-0077

PROJECT NO. 2304

TASK NO. AS

MONITOR: AFOSR, XC
TR-94-0585, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this three year study is to develop robust and adaptive guidance and controls laws for homing missiles, mechanizable with near-future computer technology, which can satisfy system objectives in the presence of large uncertainties and nonlinearities. Over the past years, considerable progress has been made in resolving some of the fundamental issues in homing guidance. Of particular importance, new filter structures which were tailored to the passive homing engagement, and new target models and kinematic pseudo-measurements, which modified the new filter algorithm and induced a new adaptive homing guidance law, were developed. During the last three years in support of these important innovations, robust filters and control schemes which further enhance system performance were developed based upon a stochastic control problem known as the linear-exponential-Gaussian-problem and a related deterministic approach called the disturbance attenuation problem. Most important, emerging from this work is a new structure for adaptive control and a unifying framework for developing midcourse and terminal homing missile guidance schemes under uncertainty. Robust control, Stochastic control, Estimation

DESCRIPTORS: (U) *TERMINAL HOMING, *TERMINAL GUIDANCE,

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AD-A285 238 CONTINUED

*HOMING DEVICES, ALGORITHMS, APPROACH, ATTENUATION, COMPUTERS, CONTROL, FILTERS, GUIDANCE, HOMING, KINEMATICS, MEASUREMENT, MODELS, STOCHASTIC CONTROL, STRUCTURES, TARGETS, TERMINALS, UNCERTAINTY, WORK, GUIDED MISSILE TRACKING SYSTEMS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304AS.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 237 5/8

UTAH UNIV SALT LAKE CITY DEPT OF PSYCHOLOGY

(U) Studies of Novel Popout.

DESCRIPTIVE NOTE: Annual rept. 15 Aug 92-14 Aug 94,

AUG 94 22P

PERSONAL AUTHORS: Johnston, William A.; Schwarting, Irene S.; Hawley, Kevin J.

CONTRACT NO. F49620-92-J-0473

PROJECT NO. 2313

TASK NO. BS

MONITOR: AFOSR, XC
TR-94-0590, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Familiar arrays of objects are perceived better than novel arrays, indicating a perceptual bias toward expected inputs. Yet a novel object in an otherwise familiar array attracts attention, indicating a perceptual bias toward unexpected inputs. These phenomena describe a highly adaptive system but pose a paradox: How can the mind be biased simultaneously toward both what it most expects and what it least expects? Our research on novel popout illuminates the empirical boundaries of this stability/plasticity dilemma, and our computational model, called mismatch theory, provides a resolution. In this report we summarize the last two years of research on novel popout and the evolution of mismatch theory. Among other findings, we cite evidence that novel popout represents an automatic and conceptually-driven form of attention capture and that it is not attributable exclusively to simple feature analysis. We argue that the data undermine certain widespread concepts of attention but are in accord with mismatch theory. The general idea behind mismatch theory is that because the processing of expected inputs can be knowledge-based or conceptually-driven data-driven processing can be inhibited for expected inputs and thereby dedicated to any unexpected inputs. Mismatch theory accommodates our findings and resolves the stability/plasticity dilemma without appealing to the concept of attention as a special gate-

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keeping device between preattentive and post-attentive processing. Instead, no distinction is drawn between pre-attention and post-attention, and attention is viewed as an emergent phenomenon of ordinary perceptual processes.

DESCRIPTORS: (U) *ATTENTION, *PERCEPTION(PSYCHOLOGY), ADAPTIVE SYSTEMS, ARRAYS, AUTOMATIC, BIAS, BOUNDARIES, INPUT, MODELS, PLASTIC PROPERTIES, PROCESSING, RESOLUTION, STABILITY, THEORY, DATA PROCESSING, KNOWLEDGE BASED SYSTEMS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313BS.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 233 6/4

VIRGINIA UNIV CHARLOTTESVILLE DEPT OF BIOLOGY

(U) Control of Circadian Behavior by Transplanted Suprachiasmatic Nuclei.

DESCRIPTIVE NOTE: Final rept. 1 Mar 93-28 Feb 94,

SEP 94 15P

PERSONAL AUTHORS: Menaker, Michael

CONTRACT NO. F49620-93-1-0185

PROJECT NO. 2312

TASK NO. CS

MONITOR: AFOSR, XC
TR-94-0588, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Over the past three years we have focused our research efforts on the study of the properties of the suprachiasmatic nucleus (SCN) of the tau mutant hamster. In general we have sought to understand how this mutation, which changes the period of circadian rhythmicity from about 2.4 hours in wild-type animals to near 20 hours in homozygous mutants, affects the SCN itself and how it affects the locomotor behavior which is driven by the SCN. Specifically we have used SCN lesions, which abolish behavioral rhythmicity, followed by transplantation of fetal or neonatal donor SCN, which restores rhythmicity, to ask which components of rhythmic behavior are intrinsic to the SCN and which may depend on its interaction with other structures. We have also studied the free running locomotor rhythms of mutant and wild-type hamsters and compared their responses to constant darkness, constant light and to phase shifting light pulses as a first step toward discovering whether the profound differences that exist in the parameters call all be accounted for by changes in the SCN.

DESCRIPTORS: (U) *CIRCADIAN RHYTHMS, *NUCLEI(BIOLOGY), ANIMALS, BEHAVIOR, CONSTANTS, DARKNESS, HAMSTERS, INTERACTIONS, LESIONS, LIGHT, LIGHT PULSES, MUTATIONS, PARAMETERS, PHASE, PULSES, RESPONSE, SHIFTING, STRUCTURES, TRANSPLANTATION, LOCOMOTION.

AD-A285 233 CONTINUED

IDENTIFIERS: (U) WUAFOSR2312CS, PE61102F, Suprachiasmatic nuclei, Homozygous

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 230 11/4 9/1 7/2

NORTH DAKOTA STATE UNIV FARGO

(U) Low Temperature Synthesis of Semiconductor Materials.

DESCRIPTIVE NOTE: Annual rept. 15 Aug 92-14 Aug 93,

SEP 93 13P

PERSONAL AUTHORS: Boudjouk, Philip

CONTRACT NO. F49620-92-J-0431

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XC
TR-94-0601, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The results of one year's effort to produce single source precursors that will generate high yields of semiconductor materials consisting of elements from groups 14 and 16 are summarized in this report. Laboratory studies demonstrate that compounds in which bonds between group 14 and 16 elements exist and in which remaining valences are occupied with phenyl groups are excellent sources of phase pure binary compounds such as tin sulfide, tin selenide and tin telluride. Mechanistic studies reveal that phenyl migration is the dominant reaction pathway allowing formation of the target compounds at temperatures as low as 300 deg C. Tin sulfide, Tin selenide, Tin telluride, Single source precursors, Semiconductors

DESCRIPTORS: (U) *MATERIALS, *SEMICONDUCTORS, *TIN, *LOW TEMPERATURE, BINARY COMPOUNDS, LABORATORIES, MIGRATION, PHASE, PRECURSORS, SELENIDES, SULFIDES, CHEMICAL BONDS, VALENCE, TARGETS, TELLURIDES, TEMPERATURE, PHENYL RADICALS, CHEMICAL REACTIONS, METALS, PYROLYSIS, CYCLIC COMPOUNDS, SYNTHESIS, COMPOSITE MATERIALS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, Single source, Group 14, Group 16, *Chalcogenides.

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AD-A285 229 4/1 7/4 20/9

BOSTON UNIV MA CENTER FOR SPACE PHYSICS

(U) Metallic Ions and Atoms in the Upper Atmosphere.

DESCRIPTIVE NOTE: Final rept. 1 Jan 92-31 Dec 93,

FEB 94 10P

PERSONAL AUTHORS: Forbes, Jeffrey M.

CONTRACT NO. F49620-92-J-0092

PROJECT NO. 2310

TASK NO. BS

MONITOR: AFOSR, XC
TR-94-0582, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The main focus of research under AFOSR Grant F49620-920-J-0092 is to investigate the global and local transport of metallic ions in the upper atmosphere, in particular the layering of ionization, through use of comprehensive numerical models which account for realistic meteoric sources, chemical conversions and sinks, and transport by molecular and eddy diffusion, winds and electric fields. The ultimate goal is to better understand the mechanisms producing ionization layers, and ultimately the seasonal, latitudinal, local time, and temporal variations in the occurrences of ionization layers. Plasma layering can affect HF communications by introducing new reflection paths thus complicating the propagating modes, and presumably in extreme cases by producing blanketing effects. In addition, plasma irregularities may also accompany the sharp gradients characterizing the plasma layers.

DESCRIPTORS: (U) *UPPER ATMOSPHERE, *ATOMS, *METALS, CHEMICALS, CONVERSION, DIFFUSION, ELECTRIC FIELDS, GLOBAL, IONIZATION, IONS, LAYERS, MODELS, PATHS, TRANSPORT, VARIATIONS, WIND, LAYERS, METEORITES, MOLECULAR PROPERTIES, EDDY CURRENTS, SEASONAL VARIATIONS, PLASMAS(PHYSICS), LATITUDE, ATMOSPHERIC PHYSICS.

IDENTIFIERS: (U) WUAFOSR2310BS, Sinks

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 228 20/10 7/4 20/5 12/2

FLORIDA UNIV GAINESVILLE

(U) The Inclusion of Connected Triple Excitations in the Equation-of-Motion Coupled-Cluster Method,

AUG 94 7P

PERSONAL AUTHORS: Watts, John D.; Bartlett, Rodney J.

CONTRACT NO. F49620-93-1-0127

PROJECT NO. 2301

TASK NO. FS

MONITOR: AFOSR, XC
TR-94-0597, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v101 n4 p3073-3078, 15 Aug 94. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) We report the implementation of connected triple excitations in the equation-of-motion (EOM) coupled-cluster (CC) method for excitation energies for the first time. The reference state is described by the complete CC singles, doubles, and triples (CCSDT) method. Excited states are generated from the reference state wave function by the action of a linear excitation operator including single, double, and triple excitations. The excited state wave functions and energies are obtained by diagonalizing the effective Hamiltonian e sup (-T) He sup (T) where T is the cluster operator for the reference state, in the space of singly, doubly and triply excited determinants. Comparison is made with full configuration interaction excitation energies for several examples (CH+, Be, SiH2, and CH2). These show that EOM-CCSDT is able to describe states which are doubly excited relative to the reference state, as well as singly excited states. Calculations of several excitation energies of BH using an extended basis set are also reported, and show good agreement with experiment

DESCRIPTORS: (U) *EXCITATION, *EQUATIONS OF MOTION, CONFIGURATIONS, FUNCTIONS, INTERACTIONS, TIME, WAVE FUNCTIONS, REPRINTS, ENERGY, ELECTRON TRANSITIONS,

AD-A285 228 CONTINUED

QUANTUM THEORY, ATOMS, MOLECULES.

IDENTIFIERS: (U) WU2301FS, PE61102F, Inclusion, *Connected triple, *Coupled-cluster method, CCSDT(Coupled Cluster Singles Doubles Triples), Basis sets, Chemical physics

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 225 9/1 20/5 20/6

ROCHESTER UNIV NY DEPT OF CHEMISTRY

(U) Nonlinear Optical Response of Condined Excitions in Molecular and Semiconductor Nanostructures.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 92-30 Sep 93,

SEP 93 6P

PERSONAL AUTHORS: Mukamel, Shaul

CONTRACT NO. F49620-93-1-0055

PROJECT NO. 3484

TASK NO. XS

MONITOR: AFOSR, XC
TR-94-0587, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A dynamical theory that connects electronic motions and the nonlinear optical response of conjugated polyenes is developed by introducing the concept of electronic normal modes. A novel picture for the mechanism of optical nonlinearities is obtained by identifying the few dominant modes. This quasiparticle electron-hole representation established a close analogy with small semiconductor particles (quantum dots), and is very different for the traditional approach based on the electronic eigenstates. The effective conjugation length (coherence size), which controls the scaling and saturation of the static third order susceptibility X(3) with the number of double bonds, is related to the coherence of the relative motion of electron-hole pairs created upon optical excitation

DESCRIPTORS: (U) *NONLINEAR OPTICS, *EXCITONS, *MOLECULAR STRUCTURE, *SEMICONDUCTORS, COHERENCE, CONTROL, ELECTRONICS, ELECTRONS, EXCITATION, LENGTH, MOTION, PARTICLES, PICTURES, RESPONSE, SATURATION, SEMICONDUCTORS, STATICS, THEORY, DYNAMICS, CHEMICAL BONDS.

IDENTIFIERS: (U) WUAFOSR3484XS, PE61103D, *Nanostructures, Conjugated Polyenes, Electron-hole, Quantum dots, Polyenes

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AD-A285 224 7/4 20/5 7/2 9/3

KANSAS STATE UNIV MANHATTAN DEPT OF CHEMISTRY

(U) Excited State Chemistry of PF, NF, and NCl.

DESCRIPTIVE NOTE: Annual rept. 15 May 92-14 May 93,

MAY 93 11P

PERSONAL AUTHORS: Setser, D. W.

CONTRACT NO. F49620-92-J-0275

PROJECT NO. 1601

TASK NO. 08

MONITOR: AFOSR, XC
TR-94-0613, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of our research program is to develop gas phase, chemically driven, energy storage systems that can serve as the media for short wavelength, electronic-transition lasers. We have selected the PF, AsF, and NF molecules for study, because of the success in the chemical generation and utilization of the excited singlet states of O2 in the oxygen-iodine laser. Our goals are to develop laboratory sources of the singlet states of PF and AsF and to characterize these states. We also wish to develop chemical sources of these molecules and then to utilize this stored energy, perhaps by energy-pooling reactions, to form a suitable upper laser state. Our laboratory already has considerable experience with the chemistry of the NF system. Unfortunately, NF(a) has not been successfully coupled to an acceptor state (other than perhaps I Atoms) to build a laser

DESCRIPTORS: (U) *CHEMISTRY, *LASERS, *EXCITATION, *PHOSPHORUS, *FLUORIDES, *ARSENIC, *NITROGEN, ATOMS, CHEMICALS, ELECTRONICS, ENERGY STORAGE, IODINE, LABORATORIES, MEDIA, MOLECULES, PHASE, SHORT WAVELENGTHS, STORAGE, TRANSITIONS, UTILIZATION, ELECTRON TRANSITIONS, GASES, CHLORIDES, CHEMICAL REACTIONS.

IDENTIFIERS: (U) WUAFOSR160108, PE63218C, Singlet state

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 223 7/4 20/5 7/3 20/10

FLORIDA UNIV GAINESVILLE

(U) Metastability in Molecules.

DESCRIPTIVE NOTE: Annual rept. 1993,

SEP 94 13P

PERSONAL AUTHORS: Bartlett, Rodney J.

CONTRACT NO. F49620-92-J-0141

PROJECT NO. 2303

TASK NO. FS

MONITOR: AFOSR, XC
TR-94-0598, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Synthesis and detonation of energetic materials involves several critical oxidation processes and associated intermediates. Carbonyl oxide, and its cyclic isomeric form, dioxirane, are two key compounds in such processes. Carbonyl oxide has never been observed experimentally, though it is one of the most discussed compounds awaiting detection. We performed high level coupled-cluster CCSD(T) calculations to characterize carbonyl oxide. These studies employed recently developed open-shell analytical gradients methods for CCSD(T), without which structures and vibrational frequencies would be difficult to obtain. The Delta H sub f deg (298) for carbonyl oxide is found to be 30.2 kcal/mol, while the barrier to isomerization to dioxirane is 19.2 kcal/mol. CCSD(T) vibrational frequencies of both species are presented to facilitate identification along with the 18 O isotope shifts. Shifts as high as 45 /cm permit experimental discrimination between the two forms. Carbonyl oxide is found to be far more zwitterionic than lower level theoretical studies would suggest, in line with the viewpoint of synthetic chemists

DESCRIPTORS: (U) *METASTABLE STATE, *MOLECULES, *CARBONYL COMPOUNDS, SPECTROSCOPY, OXIDES, ISOMERS, CYCLIC COMPOUNDS, ISOTOPES, ORGANIC COMPOUNDS, COMPUTATIONS, GRADIENTS, VIBRATION, FREQUENCY, ATOMS, QUANTUM THEORY, HIGH ENERGY, ENERGETIC PROPERTIES.

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IDENTIFIERS: (U) WUAFOSR2303FS, PE61102F, *Dioxiranes, CCSD, Coupled-cluster, *Open shell molecules, HEDM, EOM(Equation of Motion)

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 209 12/1 12/5 13/8

RENSSELAER POLYTECHNIC INST TROY NY DEPT OF COMPUTER SCIENCE

(U) Numerical Methods for Singularly Perturbed Differential Equations with Applications.

DESCRIPTIVE NOTE: Final rept. 1 Apr 93-31 Mar 94,

JUN 94 22P

PERSONAL AUTHORS: Flaherty, Joseph E.

CONTRACT NO. F49620-93-1-0218

MONITOR: AFOSR, XC
TR-94-0583, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) During this one-year project, we continued our research on the development, analysis, and application of serial and parallel adaptive computational strategies for solving transient and steady partial differential systems. We concentrated on high-order methods and adaptive approaches that unite mesh refinement and coarsening (h-refinement), order variation (p-refinement), and mesh motion (r-refinement). Parallel computational techniques involved load-balancing and load-redistribution strategies for implementing these adaptive methods on distributed-memory MIMD computers. In particular, we have developed migration strategies that exchange finite elements between neighboring spatial domains of different processors. Effective load balancing in an adaptive setting requires speedy procedures since balancing must be performed frequently. Migration offers several advantages in this regard since it (i) has a low unit cost, (ii) can take advantage of locality, and (iii) can improve communications volumes. Procedures tested in two dimensional situations are being extended to three dimensions and preliminary methods, Singularly perturbed equations, Partial differential equations, Parallel computation

DESCRIPTORS: (U) *NUMERICAL METHODS AND PROCEDURES, *FINITE ELEMENT ANALYSIS, *SOFTWARE ENGINEERING, COMPUTATIONS, EXCHANGE, MESH, MIGRATION, PARTIAL DIFFERENTIAL EQUATIONS, TRANSIENTS, TWO DIMENSIONAL, VARIATIONS, ALGORITHMS, PARALLEL PROCESSING, ADAPTIVE

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SYSTEMS, PERTURBATION THEORY, MATHEMATICAL MODELS, COMPUTER AIDED MANUFACTURING, FABRICATION, CERAMIC MATRIX COMPOSITES, VAPOR DEPOSITION.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 205 7/2 7/4 20/10 20/5

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF CHEMISTRY

(U) Observation and Characterization of the ArBH van der Waals Complex through Fluorescence Excitation Spectroscopy,

AUG 94 12P

PERSONAL AUTHORS: Hwang, Eunsook; Dagdigian, Paul J.

CONTRACT NO. AFOSR-91-0383

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XC
TR-94-0614, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chemical Physics, v101 n4 p2903-2913, 15 Aug 94. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The laser fluorescence excitation spectrum of the ArBH van der Waals complex, in the vicinity of the A(1)Pi-X(1) sigma(+) (0,0) band of diatomic BH, is reported. This species was prepared in a pulsed free jet by 193 nm multiphoton dissociation of diborane seeded in Ar/He. Both rotationally resolved and diffuse bands of the ArBH complex were observed. Rotational analyses were carried out for most of the sharp bands; both perpendicular (P'= 1 +- P = 0) and parallel (P'= 0 *- P = 0) transitions were found. The assignment of the bending and van der Waals stretch vibrational quantum numbers were carried out with the help of the accompanying paper M. H. Alexander, S. Gregurick, and P. J. Dagdigian, J. Chem. Phys. 101, 2887 (1994), wherein ArBH(A,X) ab initio potential energy surfaces, and subsequently vibrational energies, are calculated. The pattern of ArBH(A) vibrational energies was found to be complicated, mainly because of the large difference in the ArBH(A) interaction energy when the unpaired pi electron is in or perpendicular to the triatomic plane. Non-bonding interactions, BH, Electronic spectroscopy.

DESCRIPTORS: (U) *BORON HYDRIDES, *EXCITATION, *FLUORESCENCE, *HYDROGEN, *SPECTROSCOPY, ALLOCATIONS, BENDING, BONDING, DIBORANES, DISSOCIATION, ARGON, ELECTRONICS, ELECTRONS, DIATOMIC MOLECULES, INTERACTIONS, LASERS, NUMBERS, PATTERNS, RESOLUTION, ROTATION, POTENTIAL ENERGY, SURFACES, TRANSITIONS, PULSES, PHOTONS, HELIUM, DIFFUSION, QUANTUM THEORY, VIBRATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1, Free jet, Multiphotons, Ab initio, Non-bonding.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 204 7/3 6/5

ILLINOIS UNIV AT URBANA COLL OF VETERINARY MEDICINE

(U) The effects of Three Hydrocarbons on the Histologic Structure of Male Rat Kidneys.

DESCRIPTIVE NOTE: Final rept. 1 Jul 93-30 Jun 94,

AUG 94 13P

PERSONAL AUTHORS: Eurell, Thomas E.

CONTRACT NO. F49620-93-1-0432

PROJECT NO. 2312

TASK NO. AS

MONITOR: AFOSR, XC
TR-0616, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Using a lysosome specific, acid phosphatase stain developed by our research team, F344 and NBR male rats were found to respond to decalin, JP-4 and JP-8 exposure. Hydrocarbon-induced renal tubular lysosomal alterations were more closely related to the length of exposure rather than the strain of experimental animal. The NBR rats (extended exposure) had significantly enlarged lysosomes that would often be located in the basal aspect of the renal tubular epithelial cell in a manner similar to the characteristic F344 male rat response, whereas, the F344 rats (short exposure) showed groups of perinuclear lysosomal aggregates in a manner similar to the characteristic NBR male rat response. This effect could not be detected using, H&E, LMBBF, and MH stains. This finding is important in regards to the controversy of alpha 2U-globulin's association with hyaline droplet nephropathy because: (1) the NBR rat demonstrates significant lysosomal alterations following extended hydrocarbon exposure in the presence of negligible concentrations of androgen-dependent alpha 2U-globulin and (2) the F344 rat demonstrates minimal lysosomal alteration following short hydrocarbon exposure in the presence of high concentrations of androgen-dependent alpha 2U-globulin. Immunohistochemical studies of renal tubular epithelial cells from NBR and F344 male rats exposed to decalin. JP-4 and JP-8 revealed that the microtubules of the cytoskeleton form a characteristic aggregate pattern in the apical portion of the cell in association with hydrocarbon-induced lysosomal alterations. The nephrotoxic effect of decalin, JP-4 and JP-8 appeared to be equivalent as judged by renal tubular lysosomal and cytoskeletal alterations. Male rat nephropathy, Hydrocarbon nephropathy, Rats, Kidney

DESCRIPTORS: (U) *ACID PHOSPHATASE, *HYDROCARBONS, *KIDNEYS, *RATS, *PATHOLOGY, ALPHA GLOBULIN, ANDROGENS, ANIMALS, CELLS, GLOBULINS, LABORATORY ANIMALS, LENGTH, MALES, ORGANIZATIONS, PATTERNS, PHOSPHATASES, RESPONSE, DAMAGE, METABOLISM, TOXICITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312AS, *Nephropathy

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 186 6/10 9/3

TEXAS UNIV HEALTH SCIENCE CENTER AT SAN ANTONIO

(U) Investigation of Laser-Induced Retinal Damage: Wavelength and Pulsewidth Dependent Mechanisms.

DESCRIPTIVE NOTE: Final technical rept. 1 Apr 91-31 Mar 94,

AUG 94 20P

PERSONAL AUTHORS: Glickman, Randolph D.

REPORT NO. UTHSCSA-OPH-94-01

CONTRACT NO. AFOSR-91-0208

PROJECT NO. 2312

TASK NO. AS

MONITOR: AFOSR, XC
TR-94-0621, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This research was initiated to develop biochemical and cellular assays of laser damage in ocular tissue. Photochemical damage was identified by evidence of oxidative reactions resulting from free radicals generated by the interaction of laser and incoherent light with ocular tissue components. Melanin contained in retinal pigment epithelial (RPE) cells formed a free radical during illumination and rapidly oxidized ascorbic acid (AA). RPE cells have a high capacity for utilizing AA; the cells have different transporters for AA and its oxidized form, dehydro-L-ascorbic acid (DHA), and efficiently reduce DHA to AA. The kinetics and specificity of these transporters were measured in these studies. In the absence of AA or other antioxidants, light-activated melanin promoted the formation of hydroperoxides of the fatty acid, linoleic acid. Thus, if intracellular antioxidants become depleted, the melanin radical may mediate some aspects of photochemical damage such as lipid peroxidation. Other assays of laser damage were investigated. Following laser exposure, release of K+ ions from RPE cells could be demonstrated, but the measured changes were small and inconsistent. Efflux of the cytoplasmic enzyme, lactate dehydrogenase, showed

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more promise as an assay for thermal or photodisruptive laser bioeffects. Laser bioeffects, Photochemical, Thermal, Melanin, Free radical, Ascorbic acid, Linoleic acid, Photosensitizer

DESCRIPTORS: (U) *ASCORBIC ACID, *LASER DAMAGE, *LASERS, *EYE, *RETINA, *EXPOSURE(PHYSIOLOGY), ANTIOXIDANTS, CELLS(BIOLOGY), DAMAGE, DEHYDROGENASES, ENZYMES, FATTY ACIDS, FREE RADICALS, HYDROPEROXIDES, ILLUMINATION, INTERACTIONS, IONS, KINETICS, LACTATES, LIGHT, LINOLEIC ACID, LIPIDS, MELANIN, PIGMENTS, RELEASE, LASER BEAMS, NERVE CELLS, PULSED LASERS.

IDENTIFIERS: (U) WUAFOSR2312AS, Wavelength, Pulsewidth

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AD-A285 178 20/8 20/5 20/10 7/4

FLORIDA UNIV GAINESVILLE

(U) Nuclear Coupling Constants Obtained by the Equation-of-Motion Coupled Cluster Theory,

94 10P

PERSONAL AUTHORS: Sekino, Hideo; Bartlett, Rodney J.

CONTRACT NO. F49620-92-J-0141

PROJECT NO. 2303

TASK NO. FS

MONITOR: AFOSR, XC
TR-94-0603, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Chemical Physics Letters, v255 p486-493 1994. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) The coupled cluster (CC) treatment of a second-order property is expressed, analytically, by a generalized sum over state formulation based upon the equation of motion CC intermediate state wavefunctions. The method is applied to calculate the Fermi contact contribution to the indirect spin-spin coupling constants (J) of several molecules; ethane, cyclopropane, cyclobutane, bicyclobutane, ethylene and hydrogen fluoride. The excellent results obtained are very close to experiment and that obtained by the full-CC response theory, but in a computationally more convenient format. We also consider, numerically, the Karplus relation for J(H-H).

DESCRIPTORS: (U) *SPIN STATES, *NUCLEAR MAGNETIC MOMENTS, CYCLOBUTANES, CYCLOPROPANES, ETHANES, ETHYLENE, FORMULATIONS, HYDROGEN FLUORIDE, EXCITATION, CLUSTERING, COUPLING(INTERACTION), QUANTUM CHEMISTRY, QUANTUM THEORY, MOLECULE MOLECULE INTERACTIONS, EQUATIONS OF MOTION, WAVE FUNCTIONS, PERTURBATION THEORY, REPRINTS.

IDENTIFIERS: (U) WUAFORS2303FS, PE61102F, Coupled cluster, Fermi contact, Spin spin coupling

AD-A285 178

AD-A285 177 20/8 7/4 7/2 20/5

CALIFORNIA UNIV LOS ANGELES DEPT OF CHEMISTRY AND BIOCHEMISTRY

(U) New Methods for Treatment of Electron Correlation and Surface Dynamics (FY91 AASERT).

DESCRIPTIVE NOTE: Annual rept. 1 Jun 93-30 May 94,

MAY 94 4P

PERSONAL AUTHORS: Carter, Emily A.

CONTRACT NO. F49620-92-J-0244

PROJECT NO. 3484

TASK NO. S2

MONITOR: AFOSR, XC
TR-94-0586, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The SiGe results were discussed in detail in the last AASERT report, so we eschew them here. The F2 reactive scattering on Si(100) was the first study in a series to ascertain the kinetics of surface processes, including etching of silicon. We calculated reaction probabilities for F2 impinging on silicon, as a function of translational and vibrational energy in the F2 molecules. We find that translational excitation is slightly more effective than vibrational excitation at increasing the reactivity of F2, but that vibrational excitation is most effective for producing precursors leading to etching (SiF2). We find that F-atom abstraction, where one Si-F bond is formed while the other F atom in the F2 molecule leaves the surface, is a very probable reaction due to the enormous exothermicity of the reaction (-100 kcal/mol exothermic do deposit only one F on the silicon surface and -200 kcal/mol to deposit both F atoms). These scattered F atoms do not have time to equilibrate with the surface, as is illustrated by the fact that they are translationally hot and do not come off in a cosine distribution. We have also recently studied the reaction of F2 molecules with stepped and defective Si(100) surfaces.

DESCRIPTORS: (U) *SURFACES, *GERMANIUM, *ELECTRONS,

AD-A285 177

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 177 CONTINUED

*CORRELATION, ATOMS, DEPOSITS, DISTRIBUTION, ENERGY, ETCHING, EXCITATION, FUNCTIONS, KINETICS, MOLECULES, PRECURSORS, REACTIVITIES, SCATTERING, SILICON, TIME, DYNAMICS, PROBABILITY, VIBRATION, FLUORINE, EXOTHERMIC REACTIONS, CHEMICAL REACTIONS, ELECTRONIC STATES, CHEMICAL BONDS.

IDENTIFIERS: (U) PE61103D, WUAFOSR3484S2, Treatment, Translational

AD-A285 176 11/4 9/1 20/3 7/2

CALIFORNIA UNIV SANTA BARBARA DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) The Impact of Low Temperature Materials on the Breakdown and Noise Properties of GaAs and InP Based Hemt's and FET's.

DESCRIPTIVE NOTE: Final rept. 1 Nov 90-30 Apr 94,

APR 94 50P

PERSONAL AUTHORS: Mishra, Umesh K.

CONTRACT NO. AFOSR-91-0111

PROJECT NO. 2305

TASK NO. BS

MONITOR: AFOSR, XC
TR-94-0592, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The breakdown voltage in GaAs field effect transistors (FET) has been the fundamental limitation of power performance in these devices. Previous studies have identified the high electric field at the drain edge of the gate metal as the cause of breakdown. At the start of this project, we successfully demonstrated that a low-temperature-grown GaAs (LTG-GaAs) surface 'insulator' dramatically improved the breakdown voltage in a GaAs MISFET. Subsequent device studies have concentrated on the use of LTG-GaAs as a surface passivation layer in GaAs MESFETs due to the potential shortcomings of a MESFET in its rf performance. Despite the early success, very little was known about the relevant electrical properties of LTG-GaAs. To better understand why LTG-GaAs works, what are its device limitations, and how device performance can be further improved, an extensive study of the material properties of LTG-GaAs has been carried out in parallel with device fabrication and testing. In this report, the results from our investigations will be split into two sections. The first section will discuss issues related to the fundamental understanding of LTG-GaAs, the second with device results using LTG-GaAs surface layers.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 176 CONTINUED

DESCRIPTORS: (U) *GALLIUM ARSENIDES, *LOW TEMPERATURE, *MATERIALS, *BREAKDOWN(ELECTRONIC THRESHOLD), *NOISE, *INDIUM PHOSPHIDES, EDGES, ELECTRIC FIELDS, ELECTRICAL PROPERTIES, FABRICATION, FIELD EFFECT TRANSISTORS, LAYERS, LIMITATIONS, METALS, POWER, SURFACES, TEMPERATURE, TRANSISTORS, VOLTAGE, COMPOSITE MATERIALS, ELECTRON MOBILITY, GATES(CIRCUITS), EPITAXIAL GROWTH, INSULATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305BS, HEMT(High Electron Mobility Transistors)

AD-A285 164 6/4 6/5

SCRIPPS RESEARCH INST LA JOLLA CA

(U) Molecular Approach to Hypothalamic Rhythms.

DESCRIPTIVE NOTE: Annual rept. 15 Mar 93-14 Mar 94,

MAR 94 41P

PERSONAL AUTHORS: Sutcliffe, J. G.

CONTRACT NO. F49620-92-J-0188

PROJECT NO. 2312

TASK NO. CS

MONITOR: AFOSR, XC
TR-94-0606, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The suprachiasmatic nucleus (SCN) of the hypothalamus is the anatomical seat of the mammalian endogenous biological clock which regulates the temporal expression of hormonal and behavioral circadian rhythms. Light, serotonin and melatonin are the dominant stimuli which affect the phase of the endogenous clock. The grantee has devised strategies to identify molecules that mediate the action of these stimuli within the SCN. The grantee has identified a novel receptor for serotonin, the 5-HT7 receptor, and determined its amino acid structure. Its pharmacological ligand binding properties have been measured and a unique profile of agonists and antagonists defined. These allowed demonstration that the 5-HT7 receptor mediated circadian activity of cultured SCN. The receptor has been shown to couple to activation of adenylyl cyclase and to be synthesized by neurons of the subparaventricular zone immediately dorsal to the SCN. Molecules whose expression within the SCN is activated by light entraining cues have also been identified.

DESCRIPTORS: (U) *BIOLOGICAL RHYTHMS, *CIRCADIAN RHYTHMS, *HYPOTHALAMUS, ACTIVATION, AMINO ACIDS, CLOCKS, DEMONSTRATIONS, LIGANDS, LIGHT, MELATONIN, MOLECULES, NERVE CELLS, PHASE, PROFILES, REGIONS, SEATS, SEROTONIN, STIMULI, STRATEGY, STRUCTURES, LIFE SUPPORT SYSTEMS, RIBONUCLEIC ACIDS.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 164 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2312CS, Biological clock, Suprachiasmatic nucleus

AD-A285 157 6/2 6/4

VIRGINIA UNIV CHARLOTTESVILLE DEPT OF BIOLOGY

(U) Photoreceptors Regulating Circadian Behavior: A Mouse Model.

DESCRIPTIVE NOTE: Annual rept. 15 Mar 93-14 Mar 94,

MAR 94 15P

PERSONAL AUTHORS: Foster, Russell G.

CONTRACT NO. F49620-92-J-0205

PROJECT NO. 2312

TASK NO. CS

MONITOR: AFOSR, XC
TR-94-0605, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) In the rd mouse the absence of rod cells and the progressive loss of cones does not result in a decrease in circadian phase shifting responses to light. By contrast, rd mice are unable to perform simple visual tasks. In addition, rodless transgenic mice, and mice homozygous for the rds mutation, show unattenuated circadian responses to light. Collectively these data suggest that cone cells lacking outer segments are sufficient to maintain normal circadian responses to light, or there may be some unidentified photoreceptor within the retina. An action spectrum for circadian responses to light in rd mice, and molecular analysis of retinally degenerate mice and blind mole rat eyes, suggests the involvement of a green cone opsin in mammalian photoentrainment.

DESCRIPTORS: (U) *PHOTORECEPTORS, *GENETICS, *CIRCADIAN RHYTHMS, ADDITION, CELLS, CONTRAST, EYE, LIGHT, MICE, MUTATIONS, PHASE, RATS, RESPONSE, RETINA, RODS, SHIFTING, RESPONSE(BIOLOGY), RIBONUCLEIC ACIDS, OSCILLATORS, NERVE CELLS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312CS.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 151 20/5 7/4 7/2

CALIFORNIA UNIV BERKELEY SPONSORED PROJECTS OFFICE

(U) Spectroscopy of the Transition State Region in Hydrogen Transfer Reactions.

DESCRIPTIVE NOTE: Final rept. 1 Nov 90-30 Apr 94,

AUG 94 6P

PERSONAL AUTHORS: Neumark, Daniel M.

CONTRACT NO. AFOSR-91-0084

MONITOR: AFOSR, XC
TR-94-0553, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The research supported by this grant is centered on probing the spectroscopy and dynamics of a variety of transient species using two anion photodetachment techniques: photoelectron spectroscopy and zero electron kinetic energy spectroscopy. Most of the research effort was devoted to the transition state spectroscopy of reactions involving H atom abstraction by fluorine atoms. We have also measured electron affinities of several radicals, and have characterized several of the excited electronic states 03 for the first time. Finally, we have begun studying weakly bound clusters in which a halide ion is solvated by known number of CO2 molecules. (Author)

DESCRIPTORS: (U) *SPECTROSCOPY, *ELECTRON TRANSITIONS, *HYDROGEN, *TRANSFER, *CHEMICAL REACTIONS, *FLUORINE, MOLECULES, ATOMS, DYNAMICS, TRANSIENTS, MOLECULAR BEAMS, ANIONS, ELECTRON SPECTROSCOPY, ELECTRONS, KINETIC ENERGY, CHEMICAL RADICALS, PULSED LASERS, EXCITATION, ELECTRONIC STATES, HALIDES, IONS, SOLVATION, CARBON DIOXIDE.

IDENTIFIERS: (U) Photodetachment, Zero, Abstraction, Negative ions, Time-of-flight measurement

AD-A285 151

AD-A285 145 11/2 20/3 20/13 20/2

BOEING DEFENSE AND SPACE GROUP SEATTLE WA

(U) Processing, Fabrication, Characterization and Device Demonstration of High Temperature Superconducting Ceramics.

DESCRIPTIVE NOTE: Quarterly technical rept. no. 3, 30 Apr-30 Jul 94,

JUL 94 27P

PERSONAL AUTHORS: Luhman, Thomas S.; Aksay, Ilhan A.

CONTRACT NO. F49620-90-C-0079

MONITOR: AFOSR, XC
TR-94-0602, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A detailed small-angle neutron scattering study of the vortex lattice in a single crystal of YBa2Cu3O7-x was made for a field of 0.5 tesla inclined at angles between 0 and 80 degrees to the crystalline c axis. The vortex lattice is triangular for all angles. For angles less than or equal to 70 degrees its orientation adjusts itself to maximize the pinning energy to densely and highly regularly spaced twin planes. These observations have important implications for the microscopic flux-pinning mechanism, and hence for the critical current achievable in YBa2Cu3O7-x. For large angles (about 80 degrees) the vortex lattice consists of independent chains in the orientation predicted by anisotropic London theory. (Author)

DESCRIPTORS: (U) *CERAMIC MATERIALS, *SUPERCONDUCTIVITY, *HIGH TEMPERATURE, *SINGLE CRYSTALS, *YTTRIUM, *BARIUM, *COPPER, *OXIDES, FABRICATION, PROCESSING, NEUTRON SCATTERING, ANISOTROPY, MAGNETS, CURRENT DENSITY.

IDENTIFIERS: (U) PE62301E, WUAFOSR747601, Device demonstration, Characterization, Small angle, Vortex lattices, Pinning energy, London theory, Flux-trap, *Microtwinned.

AD-A285 145

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 142 9/5 25/1 25/3

PHYSICAL OPTICS CORP TORRANCE CA APPLIED TECHNOLOGY DIV

(U) Resonant Tunneling Quantum Well Integrated Optical Waveguide MOdulator/Switch,

JUL 94 33P

PERSONAL AUTHORS: Kostrzewski, Andrew

CONTRACT NO. F49620-94-C-0008

MONITOR: AFOSR, XC
TR-94-0573, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) In this Phase I program, Physical Optics Corporation (POC) has investigated resonant tunneling double barrier quantum wells (RTDBQW) for application to all-optical communication networks. The RTDBQW) can be used as a building block in superfast SONET/ATM network. The proposed concept relies on the integration of an optical guided wave modulator with the RTDBQW. Several waveguide modulator architectures have been investigated, including Mach-Zehnder directional couplers. A Mach-Zehnder interferometer has been selected for the final implementation and will provide high performance. The major advantage of the proposed integrated optical waveguide modulators/switch is that it uses low voltage due to the use of the high efficiency RTDBQW diode. This, in turn, increase the theoretical speed limit of the device to the femtosecond regime. One important feature of the RTDBQW device is that its response time is limited by quantum tunneling time, not by the conventional diode transit time, which leads to high speed operation.

DESCRIPTORS: (U) *OPTICAL WAVEGUIDES, *OPTICAL COMMUNICATIONS, *OPTICAL PROCESSING, SIGNAL PROCESSING, QUANTUM WELLS, RESONANCE, MODULATORS, INTEGRATED SYSTEMS, DIODES, FABRICATION, ETCHING, INTERFEROMETERS, ALLOYS.

IDENTIFIERS: (U) Resonant tunneling, Mach Zehnder interferometers

AD-A285 142

AD-A285 122 11/4 20/6 7/1 9/1

CALIFORNIA UNIV LOS ANGELES DEPT OF MATERIALS SCIENCE AND ENGINEERING

(U) International Collaboration Program on Innovative Chemical Processing of Superior Electronic and Optical Materials.

DESCRIPTIVE NOTE: Final rept. 15 Jul 91-14 May 94,

JUL 94 21P

PERSONAL AUTHORS: Mackenzie, J. D.

CONTRACT NO. AFOSR-91-0317

PROJECT NO. 2303

TASK NO. CS

MONITOR: AFOSR, XC
TR-94-0617, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) An international collaborative research project to investigate the preparation and properties of quantum dot materials based on CdS microcrystals in various matrices has been carried out form July 1991 To May 1994. The team consisted of Professor J.D. Mackenzie (P.I.), Professor M. Yamane of the Tokyo Institute of Technology, and Professor N. Peyghambarian of the University of Arizona. Samples were prepared by the Sol-Gel method with sodium borosilicate glass and ormosils (organically modified silicates) as the matrices. The samples showed no photodarkening effect and have chi cubed values up to 10(exp -6) cgs units. Techniques were developed to limit the size distribution of the Cds while maintaining high concentrations (-10%). Waveguides were fabricated by the ion-exchange method. At their present developmental stages, the samples suggested the possibility that they can be made into a new type of lasers and also offer the potentials of achieving photochemical hole-burning at room temperature. (Author)

DESCRIPTORS: (U) *OPTICAL MATERIALS, *ELECTRONICS, *COMPOSITE MATERIALS, *INTERNATIONAL RELATIONS, *CHEMICAL ENGINEERING, LASERS, PHOTOCHEMICAL REACTIONS, PROCESSING, SILICATES, SODIUM, BORON, GLASS, CADMIUM SULFIDES,

AD-A285 122

AD-A285 122 CONTINUED

WAVEGUIDES, FABRICATION, ION EXCHANGE, ROOM TEMPERATURE.

IDENTIFIERS: (U) WUAFOSR2303CS, PE61102F, *Innovative, Hole-burning, Sol gel process, *Collaboration, Ormosils, Photodarkening effects

AD-A285 120 11/4 9/1 7/2 9/5

NORTH DAKOTA STATE UNIV FARGO

(U) Low Temperature Synthesis of Semiconductor Materials.

DESCRIPTIVE NOTE: Annual Rept. 15 Aug 93-14 Aug 94,

SEP 94 14P

PERSONAL AUTHORS: Boudjouk, Philip

CONTRACT NO. F49620-92-J-0431

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XC
TR-94-0600, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes the results obtained in the second year of the grant. During this time experiments were conducted which demonstrated that phenyl groups on heavier main group atoms undergo migration with great facility. This mobility has been utilized to prepare novel materials with a broad range of semiconducting and optoelectronic properties. Gallium arsenide and gallium phosphide have been prepared at modest temperatures (approx. 400 deg C) from easily prepared single source precursors. Work conducted in this time period led to the discovery that ternary compounds composed of tin, sulfur and selenium can be prepared in high yields at approx. 400 deg C as phase pure materials in nonstoichiometric ratios from readily available compounds. Conventional procedures call for temperatures > 1000 deg C. Also discovered was that pyrolysis of perbenzylated compounds is advantages over the alkylated analogues among which are lower toxicity, faster decomposition times and lower contamination of target products. (Author)

DESCRIPTORS: (U) *SEMICONDUCTORS, *COMPOSITE MATERIALS, *SYNTHESIS, *LOW TEMPERATURE, PHENYL RADICALS, BENZYL RADICALS, ATOMS, ORGANOMETALLIC COMPOUNDS, MIGRATION, MOBILITY, GALLIUM ARSENIDES, GALLIUM PHOSPHIDES, DECOMPOSITION, PRECURSORS, TARGETS, TERNARY COMPOUNDS, TIN, SULFUR, SELENIUM, GERMANIUM, PYROLYSIS, BINARY

AD-A285 120 CONTINUED

COMPOUNDS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, Optoelectronic properties, Perbenzylated, Nonstoichiometric, *Chalcogenides, Group 14-16 Compounds, Group 13-15 Compounds

AD-A285 089 20/2 11/4 9/3 7/3

HUGHES RESEARCH LABS MALIBU CA

(U) Liquid Crystal Materials for Laser Beam Steering.

DESCRIPTIVE NOTE: Final rept. Sep 92-Aug 94,

AUG 94 18P

PERSONAL AUTHORS: Wu, Shin-Tson; Margerum, J. D.

CONTRACT NO. F49620-92-C-0071

PROJECT NO. 1601

TASK NO. 06

MONITOR: AFOSR, XC
TR-94-0548, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Several new liquid crystal compounds have been developed for laser beam steering application. The asymmetric diakyl diphenyl-diacetylenes exhibit a low melting temperature, wide nematic range, high birefringence, low viscosity and small heat fusion enthalpy. They are excellent host materials for forming eutectic mixtures except for the small dielectric anisotropy. To enhance dielectric anisotropy, some polar diphenyl-diacetylenes and tolanes, and a new series of the nitro-azo-benzene dyes have been considered. Among these polar compounds, the nitro-azo-benzene dyes exhibit a mesogenic phase with melting temperature at about 80 deg C huge dielectric anisotropy, excellent solubility and relatively low viscosity. The solubility and viscosity of these dyes are about one order to an asymmetric diphenyl-diacetylene binary mixture reduces its threshold voltage from 3.5 to 1.7 V sub rms. (Author)

DESCRIPTORS: (U) *LIQUID CRYSTALS, *COMPOSITE MATERIALS, *LASER BEAMS, *STEERING, BIREFRINGENCE, VISCOSITY, CHEMICAL COMPOUNDS, SOLUBILITY, ACETYLENE, PHENYL RADICALS, ALKYL RADICALS, ASYMMETRY, MELTING, TEMPERATURE, HEAT OF FUSION, ENTHALPY, FLUORINE, EUTECTICS, OPTICAL PROPERTIES, DIELECTRICS, ANISOTROPY, PHASE TRANSFORMATIONS, POLARITY, NITRO RADICALS, AZOBENZENES, DYES, VOLTAGE.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 089 CONTINUED

IDENTIFIERS: (U) WUAFOSR160106, PE63218C, *Dialkyl diphenyl-diacetylenes, Mesogenic, Nematic, *Tolanes, *Diphenyl diacetylene

AD-A285 088 7/2 7/4 20/13

ROCKWELL INTERNATIONAL THOUSAND OAKS CA SCIENCE CENTER

(U) Thermal Dissociation of Halogen Azides.

DESCRIPTIVE NOTE: Final rept. 15 Apr 90-30 Jun 94,

SEP 94 160P

PERSONAL AUTHORS: Benard, D. J.

REPORT NO. SC71024.FR

CONTRACT NO. F49620-94-C-0025

MONITOR: AFOSR, XC
TR-94-0512, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Both FN3 and ClN3 were dissociated in the presence of a variety of donor molecules, either by pulsed CO2 laser excitation (using SF6 as a sensitizer) or by thermal excitation in a chemically driven shock tube. The donors were selected to support energy transfer from the metastable NF(a) and NCl(a) products of the azide dissociation reactions, and optical diagnostics were employed to study energy transfer rates, optical gain and lasing visible wavelengths. Product of NCI(a) was shown to be inefficient, however, both gain and lasing were achieved in two systems driven by NF(a). Lasting at 471 nm on the BiF9A-X) transition was obtained by transient heating of FN3/Bi(CH3)3 gas mixtures, however, power extraction was highly inefficient due to the low gain provided by the emitter and the short duration of the shock tube experiment. Much higher gain coefficients wer obtained by CO2 laser heating of FN3/B2H6/SF6 gas mixtures, which produced intense BH(A-x) chemiluminescence and lasing at 433 nm in a low volume cavity with a threshold gain of 2.5 %/cm. An improved BH donor was synthesized by reacting B2H6 with NH3 in a heated capillary oven and optical absorption diagnostics were developed for the dark BH(X) and BH(a) states. (Author)

DESCRIPTORS: (U) *HALOGENS, *AZIDES, *THERMAL PROPERTIES, RATES, DISSOCIATION, SCALING FACTOR, ENERGY TRANSFER, INVERSION, CHLORINE, SATURATION, METASTABLE STATE, MOLECULES, NITROGEN, PULSED LASERS, CARBON DIOXIDE LASERS,

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 088 CONTINUED

EXCITATION, CHEMICAL REACTIONS, SHOCK TUBES, ADSORPTION, CHEMICAL LASERS, OPTICS, KINETICS, DIAGNOSTIC EQUIPMENT, GAIN, COEFFICIENTS, BORON HYDRIDES, VISIBLE SPECTRA, CHEMILUMINESCENCE, BISMUTH, RADIATION, TRANSIENTS, QUENCHING, HEATING, OVENS, GASES, POWER, EXTRACTION, EMITTERS, LASER CAVITIES.

IDENTIFIERS: (U) Donor molecules, Capillary ovens, Pooling

AD-A285 088

AD-A285 079 20/5 7/4 20/10

FLORIDA UNIV GAINESVILLE DEPT OF CHEMISTRY

(U) Development of Practical MO Techniques for Prediction of the Properties and Behavior of Materials.

DESCRIPTIVE NOTE: Final rept. 1 Feb 92-31 Jan 94,

JAN 94 3P

PERSONAL AUTHORS: Dewar, Michael J.

PROJECT NO. 2303

TASK NO. DS

MONITOR: AFOSR, XC
TR-94-0564, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Our previous semiempirical treatments have been based on the ZDO approximations introduced by Pople, MNDO and AMI using the best of these (NDDO). Although there were good reasons to believe that the ZDO approximation is wholly unacceptable, we were forced to use it in order to obtain a treatment of practical value, i.e. one that could be applied directly to the molecules of interest to organic chemists rather than to meaninglessly simplified 'models', using generally available computers. Although the resulting treatments proved remarkably successful and have led to major developments in chemical theory, in particular in studies of reaction mechanisms. The situation has, however, changed dramatically in recent years with almost incredible increase in computing power of minicomputers due to the invention of the integrated circuit. The primary purpose of the research supported by this grant was to make use of the greatly improved computing facilities now available to us to develop a semiempirical treatment based on a full LCAO SCF MO approximation, i.e. one in which overlap is retained. (Author)

DESCRIPTORS: (U) *MATERIALS, *MOLECULAR ORBITALS, *PREDICTIONS, *OVERLAP, *ATOMIC ORBITALS, APPROXIMATION(MATHEMATICS), ELECTRONIC STATES, MOLECULAR STRUCTURE, ORGANIC CHEMISTRY, REACTION KINETICS, DIATOMIC MOLECULES, VALENCE, PHYSICAL CHEMISTRY, COMPUTERS, ELECTRONS, PHYSICAL PROPERTIES, CHEMICAL PROPERTIES.

AD-A285 079

AD-A285 079 CONTINUED

IDENTIFIERS: (U) PE61102F, MO techniques, Differential overlap, ZDO(Zero Differential Overlap), *Zero differential overlap, Semiempirical, SCF(Self-Consistent Field), NODO(Neglect of Diatomic Differential Overlap), CNDO(Complete Neglect of Differential Overlap), *Neglect of diatomic differential overlap, *Complete neglect of differential overlap, LCAO-SCF(Roothaan Equations), LCAO(Linear Combination of Atomic Orbitals)

AD-A285 079

AD-A285 076 7/4 7/2 20/5 9/3

CALIFORNIA INST OF TECH PASADENA ARTHUR AMOS NOYES LAB OF CHEMICAL PHYSICS

(U) Resonance Enhanced Multiphoton Ionization of Molecules and Molecular Fragments.

DESCRIPTIVE NOTE: Final rept. 1 Jun 90-31 Mar 94,

MAR 94 31P

PERSONAL AUTHORS: McKoy, Vincent

PROJECT NO. 2303

TASK NO. FS

MONITOR: AFOSR, XC
TR-94-0570, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) We have completed studies of ion rotational distributions produced by resonance enhanced multiphoton ionization of excited states of molecules and by single-photon ionization of ground states of jet-cooled molecules by coherent VUV radiation. The objective of this effort was to provide a robust analysis and prediction of key spectral features of interest in related experimental studies and technological applications of these laser-driven ionization techniques. Specific achievements include: identification of underlying mechanisms for anomalous behavior of ion rotational distributions in laser ionization of molecules and molecular fragments, development of schemes for exploiting such anomalous behavior to achieve state-selective production of ions, and providing needed insight into the underlying dynamics of state-resolved molecular photoionization. (Author)

DESCRIPTORS: (U) *IONIZATION, *MOLECULES, *MOLECULAR PROPERTIES, *FRAGMENTS, *RESONANCE, *PHOTONS, *LASERS, *RADIATION, EXCITATION, ABSORPTION, DECAY, AUGMENTATION, ENERGY LEVELS, ROTATION, DISTRIBUTION, GROUND STATE, JET FLOW, COOLING, COHERENCE, VACUUM ULTRAVIOLET RADIATION, SPECTRA, DETECTION, RESOLUTION, PHOTOIONIZATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303FS, *Enhanced, *Multiphoton, Ultrasensitive, REMPI(Resonance Enhanced

AD-A285 076

AD-A285 076 CONTINUED

Multiphoton Ionization), VUV(Vacuum Ultraviolet), State selected, Chemical physics

AD-A285 075 7/4 11/4 20/3 20/12

COLORADO STATE UNIV FORT COLLINS DEPT OF CHEMISTRY

(U) Electrochemical Synthesis of Ultrathin Film Composite Membranes.

DESCRIPTIVE NOTE: Final rept. 1 Apr 93-31 Mar 94,

AUG 94 8P

PERSONAL AUTHORS: Martin, C. R.

CONTRACT NO. F49620-93-1-0234

PROJECT NO. 2303

TASK NO. AS

MONITOR: AFOSR, XC
TR-94-0566, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) During the duration of this contract we have explored a variety of aspects of a general theme. The general theme is that of 'ultrathin film composite membranes.' Such membranes resulted from the need to make membranes-based separations that show high chemical selectivity yet also show high permeant flux. We have shown in the AFOSR work that these two goals (usually mutually exclusive) can be achieved and are quite useful in a variety of areas including chemical sensors and electrochemistry. (Author)

DESCRIPTORS: (U) *ELECTROCHEMISTRY, *SYNTHESIS, *THIN FILMS, *COMPOSITE MATERIALS, *MEMBRANES, DETECTORS, IONS, TRANSPORT, SEPARATION, CHEMICALS, CHEMICAL REACTIONS, CONDUCTIVITY, ELECTRONICS, COATINGS, FIBERS, COUPLINGS, ELECTRONS, POLYMERS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303AS, *Ultrathin, Conductive composites, Permeant flux, Hollow fibers, Selectivity

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 071 7/4 12/1 14/2 20/10

PRINCETON UNIV NJ DEPT OF CHEMISTRY

(U) Extraction of High Quality Potential Surfaces from Laboratory Data.

DESCRIPTIVE NOTE: Annual technical rept.,

AUG 94 8P

PERSONAL AUTHORS: Rabitz, Herschel

PROJECT NO. 3484

TASK NO. XS

MONITOR: AFOSR, XC
TR-94-0514, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A new direct inversion algorithm is being developed, capable of taking high quality laboratory pump-probe data and directly inverting it to potential surface and optical coupling coefficient information. The algorithm is based on employing the laboratory data in a two-stage noniterative inversion. Inversion with simulated data shows that the developing algorithm is capable of being highly efficient and superior to any other available techniques. (Author)

DESCRIPTORS: (U) *SURFACES, *EXTRACTION, *ALGORITHMS, *EXPERIMENTAL DATA, *LABORATORIES, DYNAMICS, QUANTUM THEORY, QUALITY, PUMPS, PROBES, OPTICS, COUPLINGS, COEFFICIENTS, HAMILTONIAN FUNCTIONS, INVERSION.

IDENTIFIERS: (U) PE61103D, WUAFOSR3484XS, *Potential, High quality

AD-A285 064 6/4

NEW YORK UNIV NY DEPT OF PSYCHOLOGY

(U) Visual Neural Development and Chromatic Aberration.

DESCRIPTIVE NOTE: Final rept. 15 Mar 92-14 Mar 94,

MAR 94 4P

PERSONAL AUTHORS: Maloney, Laurence T.

CONTRACT NO. F49620-92-J-0187

PROJECT NO. 2312

TASK NO. AS

MONITOR: AFOSR, XC
TR-94-0562, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The purpose of the research undertaken was to develop computational techniques and psychophysical methods for investigating the internal representation of visual information (shape, depth and color) in human observers. Some of the equipment needed was not available in Summer 1992. A no-cost one-year extension was requested and granted, and work on the project continued through March 1994. The following is a list of publications and presentations supported in whole or in part by the grant. A list of personnel is also included

DESCRIPTORS: (U) *VISUAL PERCEPTION, NEURAL NETS, CHROMATICITY, PSYCHOPHYSIOLOGY, SHAPE, DEPTH, COLOR VISION.

IDENTIFIERS: (U) WUAFOSR2313AS, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 055 6/5 6/15 5/8

GEORGIA UNIV ATHENS DEPT OF PHARMACOLOGY AND TOXICOLOGY

(U) Interspecies Extrapolations of Halocarbon Respiratory and Tissue Kinetics: Applications to Predicting Toxicity in Different Species.

DESCRIPTIVE NOTE: Annual rept. 15 Jul 93-14 Jul 94,

AUG 94 167P

PERSONAL AUTHORS: Dallas, Cham E.; Bruckner, J. V.; Tacket, R. L.; Reigle, T.

CONTRACT NO. AFOSR-91-0356

PROJECT NO. 1312

TASK NO. AS

MONITOR: AFOSR, XC
TR-94-0558, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A series of experiments have been conducted to provide a pharmacokinetic data base for interspecies comparisons and for formulation and validation of physiologically-based pharmacokinetic models. The basic experimental design has involved giving equal doses of halocarbons in different species, including mice, rats, and dogs. Perchloroethylene (PCE), tetrachloroethane (TET), trichloroethylene (TCE), and trichloroethane (TRI) have been employed as test chemicals, in order to evaluate the relative importance of the physicochemical property of volatility on the kinetics and toxicity of halocarbons. In order to determine the dose received in target organs and other tissues, serial samples of brain, liver, kidney, lung, heart, skeletal muscle, and adipose tissue have been taken and analyzed for halocarbon content after administration of PCE, TET, and TRI in rats, PCE and TET in dogs, and TRI in mice. For neurobehavioral studies, an operant testing system has been employed for monitoring the central nervous system effects of halocarbons. Neurobehavioral studies have been conducted following oral and inhalation exposure to PCE, and from inhalation exposure to TRI in rats.

AD-A285 055 CONTINUED

DESCRIPTORS: (U) *RESPIRATORY SYSTEM, *TISSUES(BIOLOGY), *PHARMACOKINETICS, *EXPERIMENTAL PSYCHOLOGY, EXTRAPOLATION, HALOCARBON PLASTICS, MICE, RATS, DOGS, EXPERIMENTAL DESIGN, NEUROLOGY, BEHAVIORAL SCIENCES, KINETICS, TOXICOLOGY, TOXICITY.

IDENTIFIERS: (U) PE61102F

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 053 20/4 17/5.1 20/7

COLORADO UNIV AT BOULDER DEPT OF CHEMISTRY AND BIOCHEMISTRY

(U) State-To-State Collisional Dynamics of Atmospheric Species.

DESCRIPTIVE NOTE: Technical rept. 1 Aug 93-31 Jul 94,

AUG 94 6P

PERSONAL AUTHORS: Nesbitt, David J.

REPORT NO. JILA-153-1236

CONTRACT NO. F49620-93-1-0444, $AFOSR-93-NC-231

PROJECT NO. 3484

TASK NO. XS

MONITOR: AFOSR, XC
TR-94-0559, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) THe AFOSR/AASERT research efforts over this past year have been toward the following two thrusts: (1) state-to-state collisional energy transfer in H2O, HF and CH4 in crossed molecular beams via high sensitivity, direct absorption of a single mode IR probe laser, and (2) development and testing of high resolution IR laser Dopplerimetry methods for measuring velocity and quantum-state resolved Cl + HCl scattering in open shell collision systems.

DESCRIPTORS: (U) *INFRARED LASERS, *INFRARED DETECTION, *GAS DYNAMICS, *COLLISIONS, MOLECULAR BEAMS, ENERGY TRANSFER, SUPERSONIC FLIGHT, RARE GASES, SCATTERING, SPIN STATES.

IDENTIFIERS: (U) PE61103D, WUAFOSR3484XS

AD-A285 051 12/4 12/5

SOUTHERN METHODIST UNIV DALLAS TX DEPT OF COMPUTER SCIENCE AND ENGINEERING

(U) Integer Networks with Side Constraints: Algorithms and Applications.

DESCRIPTIVE NOTE: Final rept. 1 Jan 93-30 May 94,

AUG 94 54P

PERSONAL AUTHORS: Kennington, Jeffery L.

REPORT NO. SMU-5-25154

CONTRACT NO. F49620-93-1-0091

PROJECT NO. 2304

TASK NO. DS

MONITOR: AFOSR, XC
TR-94-0581, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Many of the routing and scheduling problems which arise at the Air Mobility Command can be modelled as constrained integer networks. The network part is associated with the routing and distribution network flown by the Command and the side constraints a rise when that aircraft capacity must be shared by different commodities or some type of budget restriction must be enforced. The work presented here reports on the progress in solving this type of mathematical program

DESCRIPTORS: (U) *INTEGER PROGRAMMING, *AEROMEDICAL EVACUATION, *ROUTING, *ALGORITHMS, PROBLEM SOLVING, OPTIMIZATION, AIR FORCE RESEARCH, AIR FORCE PLANNING.

IDENTIFIERS: (U) WUAFOSR2304DS, Patient evacution model, LOGAIR Model

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A285 044 11/4 7/3 20/6 7/6

CALIFORNIA UNIV IRVINE

(U) Aryl Gels and Related Materials. Synthesis and Characterization of a New Class of Microporous Materials.

DESCRIPTIVE NOTE: Annual rept. Jul 92-Jul 94,

AUG 94 17P

PERSONAL AUTHORS: Shea, Kenneth J.

CONTRACT NO. F49620-92-J-0379

PROJECT NO. 2303

TASK NO. CS

MONITOR: AFOSR, XC
TR-94-0557, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this program is the synthesis and characterization of new families of optically responsive materials for use in optical device fabrication. The materials that have been developed are polysilsesquioxanes, hybrids of organic network polymers and inorganic oxides. The materials are prepared by sol-gel techniques employing molecular building blocks that contain a variable organic component and an inorganic oxide precursor. The resulting materials are molecular composites with no phase boundary between the organic and inorganic domains. Where the organic component of the molecular building block contains a chromophore with known NLO properties, optically responsive materials can be produced. In our efforts we have produced optical quality thin films by a combined sol-gel/electric field poling technique. The resulting poled thin films exhibit d sub 33 and r sub 33 figures of merit of 35-37 (pm/V) and 9-10 (pm/V). These values are comparable to that of lithium niobate. Work is continuing to enhance the d sub 33 and r sub 33 values as well as to improve the optical stability at elevated temperatures. (Author)

DESCRIPTORS: (U) *COMPOSITE MATERIALS, *ARYL RADICALS, *GELS, *POROUS MATERIALS, *OPTICAL MATERIALS, *POLYMERS, OXIDES, SYNTHESIS, MOLECULAR PROPERTIES, PRECURSORS,

AD-A285 044 CONTINUED

CLUSTERING, FABRICATION, HYBRID SYSTEMS, ORGANIC COMPOUNDS, STABILITY, CHROMOPHORES, TEMPERATURE, NONLINEAR OPTICS, DOPING, THIN FILMS, TRANSPARENCE, ELECTRIC FIELDS, TRANSITION METALS, LITHIUM NIOBATES, QUANTUM THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303CS, *Microporous materials, *Polysilsesquioxanes, Sol gel process, Building blocks, Poling technique

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A284 998 7/4 12/7 11/6 20/3

ELTRON RESEARCH INC BOULDER CO

(U) Electrochemical Impedance Pattern Recognition for Detection of Hidden Chemical Corrosion on Aircraft Components.

DESCRIPTIVE NOTE: Annual rept. 15 Jun-14 Aug 94,

AUG 94 4P

PERSONAL AUTHORS: Sammells, Anthony F.; Bowers, James S.

CONTRACT NO. F49620-94-C-0043

PROJECT NO. 3005

TASK NO. SS

MONITOR: AFOSR, XC
TR-94-0608, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This program is addressing the need for diagnostic instrumentation to detect the presence of hidden chemical corrosion occuring at aircraft titanium and aluminum alloys. The approach is being directed towards development of pattern recognition schemes based upon the initial on-line acquisition of electrochemical impedance spectra using Fast Fourier Transform Electrochemical Impedance Spectroscopy (FFTEIS) instrumentation from the suspect corrosion site. (Author)

DESCRIPTORS: (U) *ELECTROCHEMISTRY, *IMPEDANCE, *DETECTION, *PATTERN RECOGNITION, *CORROSION, *CHEMICAL REACTIONS, *AIRCRAFT EQUIPMENT, *ALUMINUM ALLOYS, SPECTRA, TITANIUM ALLOYS, DIAGNOSTIC EQUIPMENT, FAST FOURIER TRANSFORMS, INSTRUMENTATION, COMPUTERS, AMPLIFIERS, BESSEL FUNCTIONS, FILTERS.

IDENTIFIERS: (U) PE65502F, WUAFOSR3005SS, SBIR

AD-A284 998

AD-A284 983 7/6 20/3 20/6 11/4

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF CHEMISTRY

(U) Design of New Multi-Functional Electroactive Polymers with Emphasis on Optical Nonlinearity.

DESCRIPTIVE NOTE: Final technical rept. 1 Jun 91-31 Mar 94,

AUG 94 59P

PERSONAL AUTHORS: Dalton, Larry R.

CONTRACT NO. F49620-91-C-0054

PROJECT NO. 1601

TASK NO. 06

MONITOR: AFOSR, XC
TR-94-0549, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Synthesis and processing of organic second-order nonlinear optical materials for fabrication of electro-optic modulators are discussed. Topics dealt with in order include (1) synthesis fo chromophores characterized by large hyperpolarizability and good thermal stability, (2) covalent coupling of nonlinear optical chromophores to polymer lattices, (3) lattice hardening reactions which permit locking-in of electric field poling-induced macroscopic noncentrosymmetric order, (4) fabrication of buried channel nonlinear optical waveguides by photochemical and reactive ion etching techniques, (5) coupling of nonlinear optical waveguides to fiber optic transmission lines and drive electronics, (6) prototype device fabrication and evaluation. Various device configurations are reviewed and recent advances in applications are discussed. Comparison is made between the performance of organic and inorganic materials for electro-optic modulation applications. (Author)

DESCRIPTORS: (U) *POLYMERS, *NONLINEAR OPTICS, DESIGN CRITERIA, ORGANIC MATERIALS, ELECTROOPTICS, MODULATION, OPTICAL MATERIALS, WAVEGUIDES, THERMAL STABILITY, BIREFRINGENCE, COUPLINGS, CHROMOPHORES, SYNTHESIS, PROCESSING, COMPOSITE MATERIALS, COVALENT BONDS, IONS,

AD-A284 983

AD-A284 983 CONTINUED

CRYSTAL LATTICES, DIRECTIONAL, HARDENING, CHANNELS, ETCHING, ELECTRIC FIELDS, MODULATORS, PHOTOCHEMICAL REACTIONS, FIBER OPTICS, TRANSMISSION LINES, DRIVES(ELECTRONICS), INORGANIC MATERIALS.

IDENTIFIERS: (U) PE63218C, WUAFOSR160106, *Electroactive, *Multifunctional, Locking-in, Mach Zehnder, Poling, Directional couplers, Hyperpolarizability, DEC, Noncentrosymmetric, Reactive ion etching.

AD-A284 959 11/5 11/4 11/9 7/6

GEORGIA TECH RESEARCH INST ATLANTA

(U) Study of the Compression Behavior of High Performance Fibers.

DESCRIPTIVE NOTE: Annual rept. 1 Apr 93-30 Jun 94,

AUG 94 115P

PERSONAL AUTHORS: Kumar, Satish

CONTRACT NO. AFOSR-91-0194

PROJECT NO. 2419

TASK NO. 00

MONITOR: AFOSR, XC
TR-94-0560, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Kink band analysis has been carried out in PBZT, methyl PBZT, and Kevlar samples. Methyl PBZT and methyl PBO samples heat treated to various times and temperatures have been studied using swelling behavior in 85% and 100% methane sulfonic acid. Raman spectroscopic studies have been carried out on PAN precursor fiber, and the fiber stabilized and carbonized at different temperature (270, 400, 800, 1800, 2800 deg C). A study on the compression behavior of polymeric resins has been conducted. A review has been written on the compression behavior of polymeric materials. PBO/sulfuric acid interaction has been studied using thermogravimetric analysis, wide angle x-ray diffraction, and using 13C solid state NMR

DESCRIPTORS: (U) *FIBERS, *POLYMERS, *POLYAMIDE PLASTICS, *COMPRESSIVE PROPERTIES, *FIBER REINFORCED COMPOSITES, CROSSLINKING(CHEMISTRY), COMPRESSIVE STRENGTH, RAMAN SPECTROSCOPY, SULFURIC ACID, CARBON FIBERS, GLASS FIBERS, BUCKLING, STRESS STRAIN RELATIONS, SHEAR STRESSES, YIELD STRENGTH, THERMOPLASTIC RESINS, EPOXY RESINS, TENSILE STRENGTH, MICROMECHANICS.

IDENTIFIERS: (U) PE62102F, WUAFOSR241900, Kink bands, PBZT(Poly-P-Phenylene Benzobisthiazole), Kevlar, PAN(Polyacrylonitrile)

AD-A284 983

AD-A284 959

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A284 952 7/6 7/3 20/6 20/3

MASSACHUSETTS UNIV AMHERST DEPT OF POLYMER SCIENCE AND ENGINEERING

(U) Functional Polymers and Guest-Host Polymer Blends for Optical and Electronic Applications: A Molecular Engineering Approach.

DESCRIPTIVE NOTE: Final rept. 15 Sep 87-14 Apr 93,

APR 93 36P

PERSONAL AUTHORS: Karasz, Frank E.

CONTRACT NO. F49620-87-C-0111

PROJECT NO. D812

TASK NO. J1

MONITOR: AFOSR, XC
TR-94-0571, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The underlying premise of the research is that organic polymer films 1-100 micrometers in thickness composed of guest-host polymer materials or functional polymer materials exhibit useful optical, electro-optical or dielectric/electrical properties. Such films show promise as media for optical data-storage and processing and non-linear optics (NLO). However practical device materials require the properties to be optimized and their function (e.g. NLO activity) should be retained in time. Improved performance of organic films may be achieved through molecular design and molecular engineering and an understanding of the fundamental relationships between the macroscopic optical, electro-optical and dielectric properties and the molecular structure and molecular dynamics in the materials. To this end a major joint effort has been made for liquid crystalline side-chain (LCSC) polymers.

DESCRIPTORS: (U) *MIXTURES, *ELECTRONICS, *OPTICS, *POLYMERS, DIELECTRIC PROPERTIES, DYNAMICS, ELECTRICAL PROPERTIES, ENGINEERING, FILMS, ORGANIC COMPOUNDS, OPTICAL PROPERTIES, MATERIALS, MOLECULAR STRUCTURE, OPTICAL DATA, ELECTROOPTICS, PROCESSING, STORAGE, STRUCTURES, THICKNESS, NONLINEAR OPTICS, LIQUID CRYSTALS.

AD-A284 952

AD-A284 952 CONTINUED

IDENTIFIERS: (U) WUAFOSRD812J1, PE61103D, *Functional, *Guest-host, Side chain.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A284 950 7/2 20/2 7/4 20/6

PITTSBURGH UNIV PA SURFACE SCIENCE CENTER

(U) An Unexpected Adsorption Site Exclusion Process on Si(100)-(2x1).

DESCRIPTIVE NOTE: Annual rept. 1 Jun 93-31 May 94,

AUG 94 6P

PERSONAL AUTHORS: Yates, John T., Jr

CONTRACT NO. F49620-93-1-0341

PROJECT NO. 3484

TASK NO. XS

MONITOR: AFOSR, XC
TR-94-0551, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) STM studies are being carried out on Si(100)-(2x1) single crystal surfaces to understand the statistical site distribution of H atoms and Cl atoms. Procedures for producing the clean Si(100) surface with wide terraces have been devised, and preliminary studies have been carried out using three other measurement techniques.

DESCRIPTORS: (U) *SILICON, *SITES, *ADSORPTION, *CHLORINE, ATOMS, CRYSTALS, DISTRIBUTION, MEASUREMENT, SINGLE CRYSTALS, SURFACES, CHLORINE, CHEMISORPTION, SCANNING, TUNNELING, MICROSCOPY, HYDROGEN CHLORIDE, STATISTICS, HALOGENS.

IDENTIFIERS: (U) PE61103D, WUAFOSR3484XS, *Exclusion process, Wide terraces, Terraces

AD-A284 950

AD-A284 949 12/9 6/4

CALIFORNIA UNIV BERKELEY SCHOOL OF OPTOMETRY

(U) Spatio-Temporal Masking in Human Vision and Its Application to Image Coding.

DESCRIPTIVE NOTE: Annual technical rept.,

AUG 94 3P

PERSONAL AUTHORS: Klein, Stanley; Silverstein, D. A.

CONTRACT NO. F49620-92-J-0359

PROJECT NO. 3484

TASK NO. S4

MONITOR: AFOSR, XC
TR-94-0555, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Before an image is stored or transmitted, we have access to the original and the distorted versions. The enhanced codec is compared to the original block by block to determine which blocks have been improved by the enhancement. These blocks are then flagged for post-processing in a way that is compliant with the JPEG standard and adds nothing to the compressed image's bandwidth. The end result is a compressed image that can be decompressed on any standard JPEG decompressor, but that can be enhanced by a sophisticated decompressor. For the comparison of the original and enhanced images, we have been developing a new vision model that is specifically tailored to the detection of errors that occur within or between two JPEG codec blocks. Previous filter models have been restricted from using a large number of filters due to computational constraints which we avoid by focusing the model on a tiny spatial area of 8x16 pixels. Further, features of human vision that have been included in previous models (color, temporal, stereo etc.) are not needed for this more focused problem. Issues that have not been completely addressed by previous models, such as masking effects, are tractable and the model is more applicable to JPEG compression. Image enhancement, Vision Modeling, Image, Compression, JPEG

AD-A284 949

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A284 949 CONTINUED

DESCRIPTORS: (U) *VISION, *IMAGE PROCESSING, AUGMENTATION, BANDWIDTH, COLORS, COMPARISON, COMPRESSION, ERRORS, FILTERS, FOCUSING, HUMANS, IMAGES, MASKING, MODELS, PIXELS, DATA COMPRESSION, COMPUTER VISION.

IDENTIFIERS: (U) WUAFOSR3484S4, PE61103D, Image compression

AD-A284 945 7/2 20/5 9/3 7/4

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF CHEMISTRY

(U) Gas-Surface Interactions Near Dissociation Threshold.

DESCRIPTIVE NOTE: Annual rept. 1 May 93-30 Apr 94,

JUL 94 3P

PERSONAL AUTHORS: Reisler, Hanna; Wittig, Curt

CONTRACT NO. F49620-92-J-0230

PROJECT NO. 3484

TASK NO. S2

MONITOR: AFOSR, XC
TR-94-0569, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Our earlier studies of molecule-surface CID were extended to the case of NO2, which has been implicated as the emitting species in shuttle glow phenomena. The glow is believed to derive from the recombination of NO and atomic oxygen, yielding internally excited NO2. Because the NO2 zeroth order 2B2 excited state is strongly coupled to the 2A1 ground state, levels formed in recombination reactions emit throughout the visible. In our experiments, the reverse process was examined. Namely, NO2 entrained in a molecular beam was directed at a crystal surface and was photoexcited 2 cm (10 ms) before reaching the surface. The incident molecules had enough internal plus translational energy to undergo CID, which was observed for a range of NO2 internal excitations. Unexcited NO2 yielded no signal. Additionally, NO was detected with state and angular resolution and it was shown that products were scattered preferentially in the specular direction, ruling out a long residence time on the surface. It is most likely that NO2 decomposes rapidly following impact with the surface, in accord with k(E) measurements that indicate subpicosecond lifetimes for excess energies - 500 cm. This was the first demonstration of such an effect and supports the thesis that NO2 is responsible for the shuttle glow.

AD-A284 945 CONTINUED

DESCRIPTORS: (U) *LASERS, *GAS SURFACE INTERACTIONS, CRYSTALS, ENERGY, EXCITATION, GROUND STATE, IMPACT, INTERNAL, MEASUREMENT, MOLECULAR BEAMS, MOLECULES, OXYGEN, RECOMBINATION REACTIONS, RESOLUTION, NITROGEN DIOXIDE, ATOMIC PROPERTIES, SIGNALS, SURFACES, THESES, VISIBLE SPECTRA, PHOTOCHEMICAL REACTIONS, SPECULAR REFLECTION, GLOW DISCHARGES.

IDENTIFIERS: (U) PE61103D, WUAFOSR3484S2, *Shuttle glow, Angular, State resolution, Translational.

AD-A284 944 11/4 7/4 20/3 7/6

COLORADO STATE UNIV FORT COLLINS DEPT OF CHEMISTRY

(U) Anionically-Conductive Ultrathin Film Composite Membranes.

DESCRIPTIVE NOTE: Annual technical rept. 1 Jun 93-31 May 94,

AUG 94 8P

PERSONAL AUTHORS: Martin, Charles R.

REPORT NO. 53-2452

CONTRACT NO. F49620-83-1-0343

PROJECT NO. 3484

TASK NO. XS

MONITOR: AFOSR, XC
TR-94-0550, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) As noted in the previous technical report, we are interested in using interfacial polymerization to synthesize ultrathin film composite membranes based on electronically conductive polymers. During the previous year of AASERT funding we have expanded on this idea in a number of ways. We have done such interfacial polymerizations to make new composites for membrane-based separations, and to make novel coated-hollow fiber membranes. Ultrathin film composite membranes, Electrochemistry ion-transport

DESCRIPTORS: (U) *MEMBRANES, *ANIONS, *THIN FILMS, *COMPOSITE MATERIALS, ELECTROCHEMISTRY, FIBERS, FILMS, IONS, POLYMERIZATION, POLYMERS, SEPARATION, TRANSPORT, CONDUCTIVITY, COATINGS, SYNTHESIS, ELECTRONICS.

IDENTIFIERS: (U) PE61103D, WUAFOSR3484XS, *Conductive, *Ultrathin, Hollow.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A284 943 20/6 7/3 20/5

STANFORD UNIV CA DEPT OF CHEMISTRY

(U) AASERT-93: New High-Pressure Diagnostic Technique.

DESCRIPTIVE NOTE: Annual rept. 1 Aug 93-31 Jul 94,

JUL 94 4P

PERSONAL AUTHORS: Zare, Richard N.

CONTRACT NO. F49620-93-1-0442

PROJECT NO. 3484

TASK NO. XS

MONITOR: AFOSR, XC
TR-94-0568, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) As we outlined in our submitted proposal, progress towards making DFWM spectroscopy quantitative has been achieved. This work makes explicit how the magnitude of the DFWM signal depends on the polarizations of the three incident beams under the weak and strong-field limits. We have been using DFWM to investigate acetylene (C2H2) and methyl radical (CH3) molecules in an atmospheric pressure flame and in a low-pressure hot-filament reactor. To calibrate the measurement, acetylene is measured in the free flow of a C2H2/O2 mixture, and also in the pre-reaction zone of a C2H2/O2 flame-both with a fast flow rate of 40-50 m/s at the nozzle outlet of the mixture. The DFWM signal falls in the weak field limit (far from saturation), which means the DFWM signal is proportional to the products of the three incident beam intensities (IfIbIp).

DESCRIPTORS: (U) *FOUR WAVE MIXING, *SPECTROSCOPY, *HIGH PRESSURE, *DIAGNOSTIC EQUIPMENT, ACETYLENES, ATMOSPHERICS, BAROMETRIC PRESSURE, FILAMENTS, FLAMES, FLOW RATE, INTENSITY, LOW PRESSURE, MEASUREMENT, METHYL RADICALS, MIXTURES, MOLECULES, NOZZLES, POLARIZATION, NONLINEAR OPTICS, SATURATION, SIGNALS, PLASMAS(PHYSICS).

IDENTIFIERS: (U) PE61103D, WUAFOSR3484XS, Degenerate, Incident beams, Hot filament reactors.

AD-A284 943

AD-A284 938 6/4 5/8

COLUMBIA UNIV NEW YORK DEPT OF PSYCHOLOGY

(U) Visual Perception of Elevation.

DESCRIPTIVE NOTE: Final rept. 1 Jan 91-30 Jun 94,

AUG 94 13P

PERSONAL AUTHORS: Matin, Leonard

REPORT NO. 003

CONTRACT NO. AFOSR-91-0146

PROJECT NO. 2313

TASK NO. CS

MONITOR: AFOSR, XC
TR-94-0565, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The work at Columbia has concentrated on 4 matters: (1) Experimental work aimed at determining the aspects of individual lines and combinations of lines in the visual field that generate the substantial influence on the visual perception of eye level (VPEL). (2) Experimental work aimed at determining the aspects of individual lines and combinations of lines on the visual perception of the vertical (VPV) and visually perceived straight ahead (VPSA) & their connections with the VPEL. (3) Experimental work aimed at measuring the involvement of extraretinal control of VPEL including effects of head and eye position. (4) Theoretical work on a quantitative model of the mechanism controlling the visual influence on VPEL, VPV, and VPSA, the Great Circle Model (GCM).

DESCRIPTORS: (U) *HUMAN BODY, *VISUAL PERCEPTION, DISCRIMINATION, EYE MOVEMENTS, LABORATORIES, ROLL, PITCH(INCLINATION).

IDENTIFIERS: (U) PE61102F, WUAFOSR2313CS, Visual Perceive Eye Level, Body referenced mechanisms, Spatial summation

AD-A284 938

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A284 937 20/3 20/12 7/4 20/5

CORNELL UNIV ITHACA NY LAB OF ATOMIC AND SOLID STATE PHYSICS

(U) Resonant Charge Transfer in Hyperthermal Atomic and Molecular Ion-Surface Collisions.

DESCRIPTIVE NOTE: Final rept. 1 Jan 91-30 Jun 94,

AUG 94 35P

PERSONAL AUTHORS: Cooper, Barbara H.

CONTRACT NO. AFOSR-91-0137

PROJECT NO. 2303

TASK NO. BS

MONITOR: AFOSR, XC
TR-94-0561, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) We have investigated the interactions of hyperthermal (few to several hundred eV) atomic ions with metal surfaces, in particular the dynamics of electron transfer between the particle and surface. Progress is reported in the following areas: (1) construction of a time-of-flight spectrometer for measuring energy- and angle-resolved distributions of neutral and charged alkali atoms; (2) measurements of the magnitude and velocity-dependence of the neutralization probabilities for Li, Na, and K scattered from clean Cu(001); dramatic differences for Li, Na, and K reflect the sensitivity of nonadiabatic charge transfer to the energies and lifetimes of atomic electronic states near the surface; (3) measurements of branching ratios for Li(+), Li(-) and ground- and excited state (Li(2s) & Li(2p)) formation in Li(+) scattering from alkali-covered Cu(001), which provide a test of new multi-state charge transfer models and indicate some of the first evidence of multi-state effects in atom-surface charge transfer; (4) extensions of our multi-state studies to include formation of higher energy excited states of Li and Na, and multiple states in O(+) and O(+2) scattering; (5) observation of trajectory-dependent charge transfer for 50 eV Na(+) scattering from clean Cu(001); evidence is found for modification of the neutralization due to collision-induced defect formation in the surface; (6) preliminary measurements of trapping probabilities for 10-100 eV Na(+) scattering from clean Cu(001), which show a strong nonmonotonic dependence on the incident energy. These studies are part of a new program to investigate the mechanisms by which hyperthermal energy ion beams can be used to modify thin film growth.

DESCRIPTORS: (U) *CHARGE TRANSFER, *COLLISIONS, *ELECTRON TRANSFER, *IONS, *SURFACES, *RESONANCE, *ATOMIC PROPERTIES, ANGLES, ATOMS, DISTRIBUTION, DYNAMICS, ELECTRONIC STATES, ENERGY, INTERACTIONS, ION BEAMS, MEASUREMENT, METALS, MODELS, MODIFICATION, NEUTRAL, NEUTRALIZATION, PARTICLES, RATIOS, SCATTERING, SENSITIVITY, SPECTROMETERS, STATIC ELECTRICITY, TEST AND EVALUATION, THIN FILMS, TRAJECTORIES, VELOCITY, MOLECULAR PROPERTIES, ALKALI METALS, LITHIUM, SODIUM, POTASSIUM, CLEANING, COPPER, GROUND STATE, EXCITATION, DEFECT ANALYSIS, TRAPPING(CHARGED PARTICLES), SIMULATION, DETECTION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303BS, *Hyperthermal, Time-of-flight, Braching ratios, Magnitude

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A284 926 6/3 5/8 6/15

AD-A284 926 CONTINUED

CALIFORNIA UNIV IRVINE CENTER FOR THE NEUROBIOLOGY OF LEARNING AND MEMORY

IDENTIFIERS: (U) PE61102F

(U) Synaptic Plasticity and Memory Formation.

DESCRIPTIVE NOTE: Annual rept. 1 Jun 93-31 May 94,

MAY 94 5P

PERSONAL AUTHORS: Lynch, Gary

CONTRACT NO. F49620-92-J-0307

PROJECT NO. 2312

TASK NO. BS

MONITOR: AFOSR, XC
TR-94-0619, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Work described in past progress reports led to the conclusion that the postsynaptic glutamate receptors which mediate fast, excitatory transmission in mammalian brain are the sites at which the changes responsible for LTP occur. Moreover, pharmacological and physiological experiments indicated that the nature of the change involved a modification of receptor channel kinetics. Modelling studies, incorporating this information into a biologically realistic simulation of the receptor, resulted in a specific hypothesis about which the channel opens and closes (see Progress Report, 1992-1993). During the past year, experimental work was carried out to test this hypothesis. This involved hippocampal slices in which fast, excitatory responses were isolated by pharmacologically blocking inhibitory conductances and post-synaptic spiking. The synaptic responses in those 'disinhibited' slices are simple reflections, modified by dendritic filtering, of AMPA receptor mediated currents.

DESCRIPTORS: (U) *MEMORY(PSYCHOLOGY), *SYNAPSE, *NEUROBIOLOGY, *NEUROPHYSIOLOGY, BLOCKING, BRAIN, CHANNELS, FILTRATION, KINETICS, MODIFICATION, REFLECTION, RESPONSE, SIMULATION, SITES, TEST AND EVALUATION, WORK, PHYSIOLOGICAL EFFECTS, BLOOD BRAIN BARRIER, PLASTIC PROPERTIES.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A284 925 9/1

ARIZONA UNIV TUCSON DEPT OF MATHEMATICS

(U) Ultrashort Pulse Effects in Semiconductor Amplifiers & in Dispersive Media.

DESCRIPTIVE NOTE: Final rept. 1 Dec 90-31 Mar 94,

MAR 94 4P

PERSONAL AUTHORS: Moloney, J.; Indik, R. A.; Koch, S. W.; Newell, A. C.

CONTRACT NO. AFOSR-91-0074

PROJECT NO. 2304

TASK NO. ES

MONITOR: AFOSR, XC
TR-94-0620, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The researchers developed code for integrating envelope equations derived from scalar Maxwell's equations for a scalar field coupled to the SCB equations. This code can handle plane wave (one dimensional) and a single transverse dimension (two dimensional). At this time, the codes are being used to study the behavior of ultrashort pulses propagating in the nonlinear medium. The case of a semiconductor amplifier has been the focus. They have been able to integrate the plane wave equations for considerably longer propagation distances than had been possible previously due to the efficiency of the algorithm. In so doing, they have predicted novel effects such as pulse compression, the appearance of an adiabatic following behavior, and spontaneous pulse breakup for very high gain amplifiers. In addition they have made a study of the interactions in such art amplifier of simultaneous ultrashort strong pulses at different frequencies. This is to the ability of such a device to be used with frequency multiplexing.

DESCRIPTORS: (U) *AMPLIFIERS, *SEMICONDUCTORS, ALGORITHMS, BEHAVIOR, COMPRESSION, EFFICIENCY, HIGH GAIN, INTERACTIONS, MULTIPLEXING, ONE DIMENSIONAL, PLANE WAVES, PULSE COMPRESSION, PULSES, TRANSVERSE, TWO DIMENSIONAL,

AD-A284 925 CONTINUED

WAVE EQUATIONS, MAXWELLS EQUATIONS, COMPUTER PROGRAMS, LASERS.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4051K

AD-A284 922 5/8 6/4

HARVARD UNIV CAMBRIDGE MA DEPT OF PSYCHOLOGY

(U) Intermediate Levels of Visual Processing.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 92-30 Sep 93,

SEP 93 3P

PERSONAL AUTHORS: Nakayama, Ken

CONTRACT NO. F49620-92-J-0016

PROJECT NO. 2312

TASK NO. AS

MONITOR: AFOSR, XC
TR-94-0622, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Over the past year we have completed a number of studies on surface perception and visual attention. Although the two have been studied in isolation, during the latter part of our investigation, we have found some surprising relationships between the two.

DESCRIPTORS: (U) *THREE DIMENSIONAL, *INFORMATION PROCESSING, *VISUAL PERCEPTION, *MEMORY(PSYCHOLOGY), IMAGE PROCESSING, PERCEPTION, MODELS, VISION.

IDENTIFIERS: (U) PE61102F